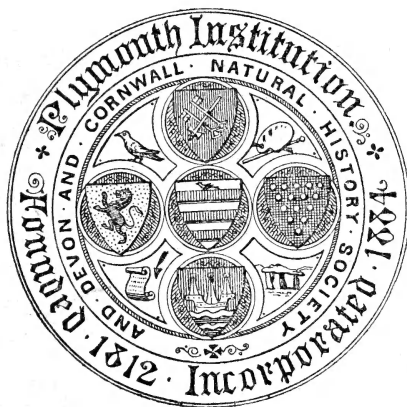


506
PL
1885/86

ANNUAL REPORT
AND
TRANSACTIONS
OF THE
PLYMOUTH INSTITUTION

AND
Devon & Cornwall Natural History Society.



VOL. IX. PART II. 1885-86.

PLYMOUTH:
W. BRENDON AND SON, GEORGE STREET.
1886.

THE LIBRARY OF THE
FEB 14 1889
UNIVERSITY OF ILLINOIS

The Authors of Lectures and Papers are alone responsible
for the statements made by them.

OFFICERS OF THE INSTITUTION.

SESSION 1885-86.

President.

MR. W. SQUARE, F.R.C.S., F.R.G.S.

Vice-Presidents.

MR. D. SLATER, M.A. DR. J. MERRIFIELD, F.R.A.S.
REV. PROF. CHAPMAN, M.A. MR. R. N. WORTH, F.G.S.

Treasurers.

MR. S. CATER. MR. E. G. BENNETT.

Secretaries.

MR. J. C. INGLIS, C.E. MR. H. PENROSE PRANCE.

Members of Council.

MR. F. H. BALKWILL.	DR. NEILD.
MR. F. BRENT, F.S.A.	DR. R. OXLAND, F.C.S.
MR. D. D. DOBELL.	MR. J. BROOKING ROWE, F.S.A., F.L.S.
REV. G. EVANS, M.A.	MR. W. G. TWEEDY, B.A.
MR. P. MITCHELL.	MR. F. J. WEBB, F.G.S.

The above form the Council.

Curators.

Library—MR. J. BROOKING ROWE, F.S.A., F.L.S.

Building—MR. J. C. INGLIS, C.E. *Fine Arts*—MR. P. MITCHELL.

Museum Curators.

Anthropology—MR. F. BRENT, F.S.A.

Mammalia—MR. F. H. BALKWILL. *Birds*—MR. H. M. EVANS.

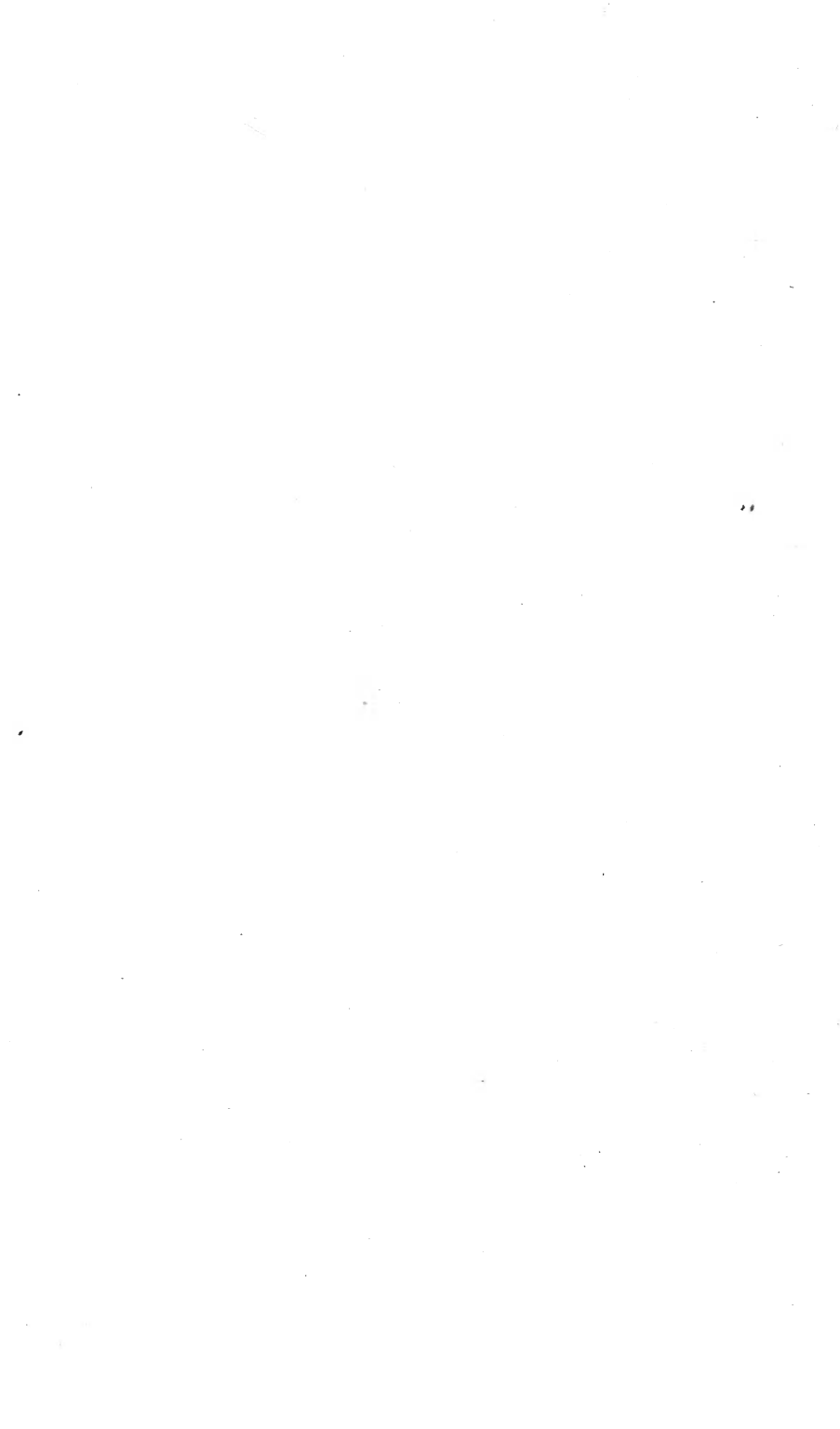
Fishes—MR. G. JACKSON, F.R.C.S.

Invertebrata—{ MR. G. BIGNELL, F.E.S. MR. F. BRENT, F.S.A.
MR. R. N. WORTH, F.G.S.

Botany—MR. D. DOBELL.

Mineralogy—DR. OXLAND, F.C.S. *Geology*—MR. F. J. WEBB, F.G.S.

Petrology—MR. R. N. WORTH, F.G.S.



LIST OF MEMBERS.

HONORARY MEMBERS.

Elected.	Name.	Address.
1865	Adams, J. C., D.C.L., F.R.A.S.	The Observatory, Cambridge.
1877	Beal, Rev. Professor, B.A., M.R.A.S.	Wark Rectory, Hexham.
1874	Froude, James Anthony, M.A.	5, Onslow Gardens, London, W.
1859	Gibbs, F. W., C.B., 24, Mount Street,	Grosvenor Square, London, W.
1877	Günther, Dr. A., F.R.S., F.L.S., F.Z.S.	British Museum, London.
1865	Lubbock, Sir John, Bart., D.C.L., F.R.S., F.L.S.,	High Elms, Kent.
1874	Pengelly, W., F.R.S., F.G.S.	Lamorna, Torquay.
1859	Scrivener, Rev. F. H. A., M.A., LL.D.,	Hendon, Middlesex.
1875	Temple, Right Rev. Dr., Bishop of London,	The Palace, Fulham.
1865	Vivian, Edward, M.A.	Torquay.
1872	Weymouth, R. F., D.LIT.	Mill Hill, London.
1872	Worth, R. N., F.G.S.	4, Seaton Road.

LIFE MEMBERS.

1855	Alger, J.	Sydney, Australia.
1863	Alger, W. H.	Widley Court, near Plymouth.
1856	Bartlett, G.	Plymouth.

CORRESPONDING MEMBERS.

1856	Harding, Col., F.G.S.	Upcott, Barnstaple.
1858	Ormerod, G. W., M.A., F.G.S.	Woodway, Teignmouth.
1858	Peach, C. W., A.L.S.	30, Haddington Place, Edinburgh.
1863	Vicary, W., F.G.S.	Exeter.

LECTURING MEMBERS.

1868	Adams, W.	Frankfort Street.
1881	Aldridge, Charles, M.D.	Plympton House, Plympton.
1860	Anthony, Rev. Professor, M.A.	13, Woodland Terrace.
1884	Babb, H. R.	21, Portland Square.
1864	Balkwill, Francis Hancock	Princess Square.
1882	Bampton, Augustus H., M.D.	North Devon Place.
1852	Bate, C. Spence, F.R.S.	Mulgrave Place.
1884	Batten, J. Maxwell	Plymouth College, Ford Park.
1863	Bennett, E. G.	10, Woodland Terrace.
1826	Bennett, J. N.	Windsor Villas.
1884	Bignell, George C., M.E.S.	8, Clarence Place, Stonehouse.
1877	Bird, Rev. Benwell	Wychbury, Fernleigh Road.
1861	Brent, Francis, F.S.A.	19, Clarendon Place.
1885	Brenton, W. H.	7, Westbury Terrace, North Road.
1862	Briggs, Thomas Rider Archer, F.L.S.	Fursdon, Knackersknowle, near Plymouth.

LECTURING MEMBERS—*continued.*

Elected.	Name.	Address.
1884	Buchan, W. A., M.B.	South Devon Hospital.
1881	Burnard, Charles F.	Chatsworth Lodge, Compton Park Road
1851	Cater, Samuel	North Devon Place.
1876	Chapman, Rev. Professor, M.A.	Western College, Tavistock Road.
1880	Clarke, Edward, M.P., Huntingdon	Lodge, Peckham Road, London.
1851	Collier, W. F.	Woodtown, Horrabridge.
1876	Collier, Miss Bertha Cybill	Woodtown, Horrabridge.
1876	Collier, Charles Calmady	Woodtown, Horrabridge.
1884	Collier, G. B., B.A.	Woodtown, Horrabridge.
1867	Collier, Robert	7, Chelsea Embankment, London.
1877	Coney, Rev. Thomas, M.A.	4, Wingfield Villas, Stoke.
1885	Crealock, W. S., R.N.	3, Houndiscombe Place.
1882	Debnam, Alfred R.	10, Higher Portland Place, Stoke.
1884	Dickson, Rev. W., LL.D.	53, Haddington Road, Stoke.
1884	Dobell, Douglas D.	1, Auburn Place.
1884	Edlin, Edward Holberton, M.R.C.S. ENG., F.R.C.S. EDIN.,	1, Braidwood Ter.
1880	Edmonds, Robert G.	Mount Drake.
1882	Evans, H. Montague	8, South Devon Place
1884	Evans, Rev. G., M.A.	8, Washington Terrace, Alexandra Road.
1884	Evans, Godfrey	4, Rochester Terrace.
1874	Fouracre, John T.	Chapel Street, Stonehouse.
1875	Fox, Francis E., B.A., F.R.G.S.	Uplands, Tamerton Foliot.
1868	Fox, R. R.	Westbrook, Tamerton.
1851	Harper, T., M.R.C.S.	1, Gibbon Street.
1852	Hine, James, F.R.I.B.A.	Mulgrave Place.
1867	Hingston, C. Albert, M.D.	2, Sussex Terrace.
1875	Hughes, R. H., M.A., M.B., M.R.C.S.	12, Lockyer Street.
1876	Inglis, James C., C.E.	1, Buckland Terrace.
1881	Inskip, Capt. G., R.N., F.R.G.S.	Torrington House, North Road.
1868	Jackson, George, F.R.C.S.	1, St. George's Terrace.
1851	Jago, George	Cobourg Street.
1882	Jago, C. S., F.R.G.S.	Cobourg Street.
1882	Jewers, Arthur J., F.S.A.	6, Seaton Terrace, Mutley.
1880	Macliver, Peter Stewart	Ardnave, Weston-super-Mare.
1885	McCarthy, R. H.	H.M. Customs, Parade.
1874	Merrifield, John, LL.D., F.R.A.S., F.M.S.,	Gascoyne Place.
1862	Mitchell, Philip	Bedford Terrace.
1853	Monkswell, The Right Hon. Lord	7, Chelsea Embankment, London.
1851	Moore, W. Foster	The Friary.
1870	Morley, The Right Hon. the Earl of	31, Princess Gardens, South Kensington, London, S.W.
1861	Mount Edgcumbe, The Right Hon. the Earl of,	Mount Edgcumbe, Devonport.
1878	Neild, Frederic, M.D.	6, Sussex Terrace.
1885	Nicolls, Edward	3, Holyrood Terrace.
1884	Norman, John G.	Sea View Terrace.
1851	Oxland, R., PH.D., F.C.S.	Portland Square.

LECTURING MEMBERS—*continued.*

Elected.	Name.	Address.
1871	Pearse, W. H., M.D.	1, Alfred Place.
1880	Power, W.	H.M. Customs, Parade.
1883	Prance, H. Penrose	7, Athenæum Terrace.
1859	Prowse, A. P.	Yanadon, Horrabridge.
1884	Radford, Charles H.	37, Bedford Street.
1880	Reed, William Cash, M.D.	9, Princess Square.
1880	Rew, G. Gale	3, Whitefield Terrace.
1884	Rice, J.	21, Walker Terrace.
1875	Rider, A., F.C.S.	4, Haddington Road, Stoke.
1857	Risk, Rev. J. Erskine, M.A.	Princess Square.
1861	Rowe, J. Brooking, F.S.A., F.L.S.	Mulgrave Street.
1860	Shelly, John	Princess Square.
1875	Smith, Robert	George Street.
1867	Slater, D., M.A.	Cheveley Hall, Seymour Road.
1869	Square, W., F.R.C.S., F.R.G.S.	Portland Square.
1883	Square, William Joseph, F.R.C.S.	Portland Square.
1884	Square, J. Elliot	Portland Square.
1876	Tippetts, G. E.	The Mount, Mannamead Avenue.
1885	Tremain, F.	5, King Street, Plymouth.
1865	Tweedy, W. Gage, B.A.	Athenæum Terrace.
1884	Vincent, Rev. Samuel	6, Woodland Terrace.
1885	Wade, William Cecil	5, Portland Square.
1883	Watson, G. F.	3, Walker Terrace.
1875	Webb, F. J., F.G.S.	13, Portland Villas.
1864	Weekes, Samuel	Sussex Terrace.
1873	Woolcombe, R. W.	St. Jean D'Acre Terrace, Stoke.
1879	Worth, R. N., F.G.S.	4, Seaton Road.
1878	Wright, W. H. K., F.R.H.S.	31, Headlands Park.
1885	Wyatt, P. C.	Clifton House Grammar School.

"The property of the Institution, the election of members, management of the concerns, and enactment of laws, are vested exclusively in the Lecturing Members."—LAW 5.

ASSOCIATES.

Allport, S., 8, Houndiscombe Place, North Road.	Chalker, John P., 9, Crescent Place.
Adams, Benjamin, Walmer Villa.	Chambers, Henry, 23, Clarendon Place.
Barrett, G. R., Bank of England Place.	Champernowne, A., F.G.S., Darting- ton House, Totnes.
Barrett, J., 8, Staddon Terrace.	Clark, W., Thorn Park Villas.
Bayly, John, Seven Trees.	Coath, J., 7, Holyrood Place.
Bayly, Robert, Torr Grove, Plymouth.	Cole, A., Bedford Terrace.
Bazeley, William, 2, Queen Anne Ter.	Compton, C. E., 2, Mutley Park; Terrace.
Beechey, Admiral, 13, St. James's Terrace.	Daubeny, Major G. A., Naval Bank.
Bellamy, G. D., Endsleigh Place.	Dawe, R. H., Buckland Terrace.
Bennett, John, M.A., Princess Square.	Derry, Wm., Houndiscombe House.
Berry, J. P., 2, Walker Terrace.	Deutsch, Herr, 3, Hoe Park Place.
Bragington, G., Ford Park.	Diment, Thomas, 8, Brunswick Terrace.
Brendon, W. Turner, George Street.	Edgcombe, F. H., 17, Wyndham Square.
Brown, J. P., The Abbey, Plymouth.	Fell, Thomas, 23, Princess Square.
Brown, G. H., Mill Lane.	
Bulteel, Thomas, Radford, Plymouth.	

ASSOCIATES—*continued.*

- Fisher, C., 1, Victoria Place, Stonehouse.
 Foale, William, jun., 3, Meadsfoot Terrace, Mannamead.
 Foster, J. B., 4, Cambridge Street.
 Fox, E., Hillside.
 Gale, Dr. J., M.A., F.G.S., F.C.S., Lockyer Street.
 Gibbons, W., 21, Headlands Park.
 Gillon, Capt. W., 1st Battn. H.L.I., Raglan Barracks.
 Goad, J., Buckingham Place.
 Goulding, F. H., George Street.
 Greenlaw, William, Lipson Cottage.
 Haite, John, c.e., Dockyard Devonport, and 72, Durnford Street, Stonehouse.
 Hall, Frederick, George Street.
 Harris, Henry Vigurs, Union Street.
 Harris, W. H., Parade, Plymouth.
 Header, H. P., Westwell Street.
 Heath, William, George Street.
 Hender, J., S. D. & C. Railway Office, Millbay Road.
 Hendry, A. S., 6, Lockyer Street.
 Hoppen, Vosper, George Street.
 Hoskin, R., 16, Clarence Place, Plymouth.
 Hubbard, G., Ford Park.
 Hurrell, H., Peveril Park.
 Jago-Trelawny, Major-Gen., Col-drennick, Cornwall.
 Jago, Richard, Hallwell House, Hallwell Street.
 James, Capt., R. W. Yacht Club.
 James, C. H., Ingleside, Mannamead.
 James, Edward, Greenbank.
 James, E. H., Woodside.
 James, W. C., J.P., 6, Glenside, College Road.
 Jasper, J., 2, Melville Place, Ford.
 Jenkins, James, M.D., Nevingstone, Mannamead.
 Keen, Henry, St. James's Terrace.
 Kerswell, Alfred J., Ham Street.
 Kerswell, Samuel, 1, Osborne Place.
 Kerswill, F. J., Frankfort Street.
 King, William, Hoe House.
 Lampen, Gen. J., 6, Alton Terrace.
 Latimer, Alfred, Portland Square.
 Lemann, Fred. C., Blackfriars House.
 Lemon, Rev. T. W., M.A., 1, Cheltenham Place.
 Linton, John, Ford Park, Plymouth.
 Mabin, Francis, 10, Union Street.
 Martin, W., Windsor Villas.
 Martin, Henry, Commercial Wharf, Plymouth.
 McAndrew, J., Lukesland, Ivybridge.
 Mitchell, T., Eton Villas.
 Morrish, F. A., 2, Bedford Terrace.
 Morris, Charles, 5, Seymour Terrace.
 Mugford, James A., Elm Villa, Mannamead.
 Page, James A., 10, Windsor Terrace.
 Pagen, F. Fletcher, F.G.S., Pendower, Mannamead.
 Payne, James, 21, Clarendon Place.
 Pearce, Miss Alice, Bedford Terrace.
 Pearce, S., Royal Hotel.
 Pearce, T., M.D., Flora Place.
 Penrose, Richard A., 74, Durnford Street, Stonehouse.
 Penson, James, 7, Boon's Place.
 Philips, G., 1, Victoria Place, Stonehouse.
 Picken, Samuel, 12, Hill Park Crescent.
 Pode, J. Duke, J.P., Slade, Ivybridge.
 Polkinghorne, W. H., Royal William Victualling Yard, Stonehouse.
 Preston, H., Old Town Street.
 Randle, J., Union Street.
 Ridge, B. J., 3, Gainsborough Place.
 Rodd, R. R., jun., 63, Union Street, Stonehouse.
 Rooke, Samuel, 5, Westbury Terrace.
 Rorie, John, M.D., Ford Park.
 Roy, David, 6, Holyrood Place.
 Russell, G., Hoe Park House.
 Serpell, E. W., 19, Hill Park Crescent.
 Smith, E. S., Old Town Street.
 Stephenson, G., Old Town Street.
 Stephenson, R., National and Provincial Bank of Eng., Devonport.
 Stribley, Edwin, 3, Kobe Terrace.
 Taylor, Frank, 37, Flora Street.
 Taylor, J., 37, Flora Street.
 Taylor, Sidney, 37, Flora Street.
 Trehane, J. H., Princess Square.
 Trelawny, Sir W., Bart., Trelawne.
 Widger, James, 14, Tavistock Street.
 Williams, H. J., Polperro, Cornwall.
 Willoughby, J., Stafford Terrace.
 Willoughby, W., The Foundry.
 Wills, J. C., 68, Durnford Street, Stonehouse.
 Wilson, J. Walter, Hoe Park Terrace.
 Windeatt, John, Woodland House.
 Woodhouse, Henri B. S., 15, Portland Square.

LADY ASSOCIATES.

Borland, Mrs. R., Emma Place, Stonehouse.	Cooper, Miss Agnes G., 12, Cheltenham Place.
Bragg, Miss, Weston Lodge, Seymour Road, Mannamead.	Gidley, Miss, 2, St. Michael's Terrace.
Bragg, Miss S., Weston Lodge, Seymour Road, Mannamead.	Linton, Mrs., Ford Park, Plymouth.
Cann, Miss Agnes, 20, Tavistock Road.	Minhinnick, Miss E. M., Portland Square.
Coath, Miss, 7, Holyrood Place.	Twose, Mrs., 4, Clarendon Place.
	Waghorn, Miss, 20, Hill Park Crescent.

JUNIOR ASSOCIATES.

Crowther, J. B., 1, Buckland Terrace.	Worth, R. G. H., 4, Seaton Road.
---------------------------------------	----------------------------------

OF

The Plymouth Institution and Debon and Cornwall Natural History Society.

FOR THE YEAR ENDING 1ST APRIL, 1886.

By Annual Subscriptions at £1 ls. at 10s. 6d.	£	s.	d.
" "	204	15	0
" "Arrears of Subscriptions	9	9	0
" Rent of Hall	214	4	0
" Plymouth Art Club—Gas and Fires	1	1	0
" Ladies' "	4	12	0
" Subscriptions to Museum Building (paid during year)	2	0	0
" Admissions to Museum	0	12	6
" Western Counties Telephone Company, Acknowledgment for permission to attach wire to Building (one year)	145	7	0
" Balance	1	8	6
	0	1	0
	405	1	9
	<hr/>		
	£774	7	9
	<hr/>		

	£	s.	d.
To Balance	.	.	.
" Lighting and Warming—Gas	11	2	10
" "Fuel	2	9	6
" Repairs	.	.	.
" Taxes—Insurance and Water	.	.	.
" Museum and Art Gallery	.	.	.
" Library—Books, &c	40	4	7
" Binding	7	4	9
" Reports	.	.	.
" Stationery, Printing, &c.	.	.	.
" Conversazioni	.	.	.
" Salary and Commission	.	.	.
" Petty Disbursements	.	.	.
" Postages	.	.	.
" Incorporation Expenses	.	.	.
" Excursions	.	.	.
" Cheque Book	.	.	.
" Interest	.	.	.
	26	2	11
	<hr/>		
	£774	7	9
	<hr/>		

SAMUEL CATER, }
E. G. BENNETT, } *Treasurers.*

JOHN G. NORMAN, }
G. GALE REW, } *Auditors.*

SUBSCRIPTIONS

TO

MUSEUM AND ART GALLERY BUILDING ACCOUNT

PAID OR PROMISED SINCE PREVIOUS LIST.

	£	s.	d.		£	s.	d.
Morley, The Right Hon.				Collier, Mr. Mortimer .	1	0	0
the Earl of	5	0	0	Collier, Mr. W. F. . .	2	2	0
Mount Edgcumbe, The							
Right Hon. the Earl of	10	10	0	Derry, Mr. W.	1	1	0
Exeter, The Right Rev.				Dobell, Mr. D. D. . .	1	1	0
the Bishop of	1	1	0				
London, The Right Rev.				Fouracre, Mr. J. T. . .	2	0	0
the Bishop of	1	1	0	Fox, Mr. F. E.	5	0	0
Monkswell, The Right							
Hon. Lord	5	0	0	Gatcombe, Mr. J. . . .	1	1	0
Robartes, The Right Hon.							
Lord	5	5	0	Hubbard, Mr. G. . . .	1	1	0
Mayor of Plymouth, The							
Right Worshipful the,				Inglis, Mr. J. C. . . .	5	5	0
Mr. W. H. Alger . . .	5	5	0				
				Jackson, Mr. G.	1	1	0
Adams, Mr. B.	1	1	0	James, Mr. Edward . .	5	0	0
Adams, Mr. W.	1	1	0	Jenkins, Dr.	1	0	0
Balkwill, Mr. F. . . .	5	5	0	Kerswell, Mr. Alfred J. .	1	1	0
Barrett, Mr. G. R. . .	1	1	0	Kerswill, Mr. F. J. . .	1	1	0
Bayly, Mr. J.	10	10	0				
Bayly, Mr. R.	10	10	0	MacAndrew, Mr. J. J. .	10	10	0
Bignell, Mr. G. C. . .	1	1	0	Margary, Mr. P. J. . .	1	1	0
Brendon, Mr. W. T. . .	2	2	0	Miall, Mrs.	1	1	0
Brent, Mr. F.	2	2	0	Mildmay, Mr. H. B. . .	10	10	0
Brown, Mr. J. P. . . .	0	10	6	Mugford, Mr.	1	1	0
Bulteel, Harris, and Co.,							
Messrs.	5	5	0	Norman, Mr. J. G. . . .	1	1	0
Cater, Mr. S.	10	0	0	Ormerod, Mr. G. W. . .	2	2	0

	£	s.	d.		£	s.	d.
Pearn, Mr. E. A. . .	10	10	0	Shelly, Mr. J. . .	5	5	0
Pearse, Dr. W. H. . .	1	1	0	Slater, Mr. D. . .	2	2	0
Pickthall, Mrs. . .	1	1	0	Smith, Mr. R. . .	2	2	0
Plymouth Art Club . .	15	0	0	Square, Mr. W. . .	5	5	0
Pode, Mr. J. D. . .	1	1	0	Square, Mr. W. J. . .	3	0	0
Prance, Mr. H. Penrose . .	1	1	0	Stephenson, Mr. G. . .	3	0	0
Prowse, Mr. A. P. . .	1	1	0				
				Tanner, Mr. C. F. . .	5	0	0
Radford, Mr. J. H. . .	2	2	0	Tweedy, Mr. W. G. . .	1	1	0
Radford, Mr. C. R. . .	2	2	0				
Rooker, Mrs. . .	2	2	0	Wade, Mr. W. C. . .	1	1	0
Rorie, Mr. John . .	2	2	0	Webb, Mr. F. J. . .	1	1	0
Rorie, Mr. George . .	1	1	0	Weymouth, Dr. . .	2	2	0
Rowe, Mr. J. Brooking . .	10	0	0	Willoughby Bros., Messrs. . .	1	1	0
Rumble, Miss . .	5	0	0	Windeatt, Mr. John . .	10	0	0
				Worth, Mr. R. N. . .	1	1	0
Serpell, Mr. R. C. . .	2	2	0				

SECRETARIES' REPORT.

1885-86.

THE Secretaries beg to present the following Report of the Proceedings of the Society during the Session 1885-6.

The work of the Society in its various departments has been carried out with energy and success.

The average attendance at the Thursday evening meetings has been fifty-seven. The Lectures have been favourably appreciated, the discussions well sustained, and in several cases of exceptional interest and value.

Lectures were delivered in accordance with the following programme :

1885. SERIES I.

- | | | | |
|------|-----|-----------------------------------------------------|-----------------------------------------|
| Oct. | 1. | Conversazione. | |
| „ | 8. | President's Address. | |
| „ | 15. | Theories of Mesmerism and Cognate Phenomena | MR. J. RICE. |
| „ | 22. | The Rocks of Plymouth. Part I. . | MR. R. N. WORTH, F.G.S. |
| „ | 29. | The Scope of Amateur Photography | MR. TWEEDY, B.A. |
| Nov. | 5. | Marine Biological Laboratories . | MR. J. BROOKING ROWE, F.S.A.,
F.L.S. |
| „ | 12. | The Expansion of the English Race | MR. SILVANUS TREVAIL. |
| „ | 19. | School Board Work in Plymouth . | MR. H. PENROSE PRANCE. |
| „ | 26. | The Fishing Industries of the West | MR. J. B. RIDGE. |
| Dec. | 3. | Characteristics of the Fine Arts . | MR. G. EVANS. |
| „ | 10. | Notes on Local Churches & Registers | MR. A. J. JEWERS, F.S.A. |
| „ | 17. | Sanitary Science. Lecture III. . | MR. A. R. DEBNAM. |

1886. SERIES II.

- | | | | |
|------|-----|-----------------------------------------------------|----------------------------------------------------------------------|
| Jan. | 7. | Conversazione. | |
| „ | 14. | Federation. (Discussion) . . . | REV. PROF. CHAPMAN, M.A. |
| „ | 21. | The Rocks of Plymouth. Part II. | MR. R. N. WORTH, F.G.S. |
| „ | 28. | Some Facts and Theories concerning Heraldry | MR. W. C. WADE. |
| Feb. | 4. | Notes on Education | REV. W. DICKSON, LL.D. |
| „ | 11. | Shakespeare's Hamlet | MR. W. J. SQUARE, F.R.C.S. |
| „ | 18. | The Ordnance Survey | CAPT. THOMPSON, R.E. |
| „ | 25. | Antiquities of Cornwall | REV. WM. IAGO, B.A.
<i>Pres. Roy. Inst. Corn., L.S. Soc. Ant.</i> |

- Mar. 4. The Moorish Empire in Spain . MR. MCCARTHY.
 „ 11. The Enclosure of Commons, Wastes,
 and Open Spaces, with special
 reference to Dartmoor . . MR. E. NICOLLS.
 „ 18. Nomenclature of Rocks . . MR. F. J. WEBB, F.G.S.
 „ 25. The Bronze Age . . MR. F. BRENT, F.S.A.

There are now on the books of the Society one hundred and five honorary, life, corresponding, and lecturing members, one hundred and thirteen associates, two junior associates, and eleven lady associates, making a total of two hundred and thirty-one belonging to the Institution.

Considerable additions have been made to the collections in the Museum during the year, largely increasing its interest and value. Particulars of these are given in the reports of the various Curators, hereafter quoted. The Museum has, as usual, been opened free to the public every Saturday afternoon, and there is a decided increase in the public appreciation of this privilege. The Museum has also been visited during the year by several gentlemen of high scientific repute, several of whom expressed a complimentary opinion as to its value. In order to relieve the Society of the heavy burden of debt left in connection with the erection of the Museum and Art Gallery, and thus to enable it to carry on its work more efficiently, an appeal has been issued for additional subscriptions, and up to the present time £200 has been paid or promised. The Council trust to be still further aided in dealing with this liability.

Five lectures have been given to working men in connection with the Museum. They have been well attended, and evidently greatly interested the audiences. They were as follows: "Physiology," "Locomotion," by Mr. W. Square, F.R.G.S. (the President); "The Motions of the Earth," by Dr. Merrifield, F.R.A.S.; "Entomology," by Mr. G. C. Bignell, F.E.S.; "The Philosophy of an Old Bone," by Dr. Oxland, F.C.S. The Council also granted the use of the hall for a lecture to the working men by Mr. Jasper, an associate, by whom this lecture scheme was first suggested. This lecture, coming from one of themselves, proved very acceptable, and will serve to illustrate the kind of stimulus which the Museum has already given.

The Anniversary Meeting was held as usual on May 1st, 1885, when the following papers were read: "On the Abyssinian Cross

in the Museum," by Rev. G. Evans; "Fair Trade and Free Trade," by Mr. J. G. Norman.

It was intended during the summer to have a series of short excursions in connection with various branches of Science. Mr. G. H. Watson very kindly placed the yacht-trawler *Lola* at the disposal of the members for the Dredging excursion, but the weather proved too boisterous to allow of this trip meeting with the full success hoped for. The Botanical excursion to Hessenford and vicinity, under the direction of Mr. D. Dobell, proved, however, all that could be hoped. Unfavourable weather prevented the projected Geological and Archæological excursions coming off, but it is hoped that during the approaching summer this system of short excursions may be successfully developed.

The annual excursion of the members, associates, and their friends took place on July 6th, and proved most enjoyable. The weather was absolutely perfect, the attractions ample and varied, and the arrangements carried out without the slightest hitch. The party left Plymouth by the 9.30 a.m. train for Lostwithiel, where a halt was made, for the purpose of paying a visit to the magnificent ruins of Restormel Castle, which were graphically described by Mr. R. N. Worth, F.G.S. That done, the next train was taken for the quaint old-world port of Fowey. Here, by the kindness of Mr. C. De Courcy Treffry, the historic mansion of Place was visited, with its Porphyry hall and charming gardens; and then, by the courtesy of the vicar, the Rev. H. N. Purcell, the very interesting church of St. Fimbar. The next point of attraction was Menabilly, which Mr. Rashleigh very kindly permitted the members of the Society to visit, to see the beautiful grounds and romantic and almost unique mineral grotto.

Many of the party strolled back to Fowey by the cliffs—a delightful, if somewhat rugged road—and all met at a capital high tea at the Ship Hotel.

Three conversazioni have been held during the year. One was given on September 17th, 1885, to welcome to Plymouth the members of the Library Association, who held their annual meeting in this town. The opening conversazione of the Society was held on October 1st, and the pictures of the Art Club exhibition proved as usual a source of much interest and attraction. The musical portion of the programme was under the direction of Mr. J. Pardew, and Mr. J. Trehane, of Plymouth,

rendered valuable assistance. At the second conversazione, Mr. Brent, F.S.A., exhibited and described a large number of rubbings of monumental brasses from his large and valuable collection. Mr. R. N. Worth, F.G.S., exhibited a series of microscopic sections of local rocks, and read a humorous note on the evolution of the "Tannergram." The musical arrangements, which were highly appreciated, were under the direction of Mr. A. C. Faull. The Misses Ryder and Goodfellow rendered several solos, which were received with much satisfaction.

The whole of the formalities in connection with the Incorporation have now been accomplished, and the property of the Society has been transferred by the Trustees to the newly incorporated body.

The Council feel that the surviving Trustees—Mr. J. N. Bennett, Mr. C. Spence Bate, and Dr. Oxland—are entitled to the thanks of the members, on retiring from an office which now no longer exists in connection with the Institution.

The Curator of the Library reports:

"Comparatively few additions have been made to the Library. The most important are the volumes embodying the results of the *Challenger* Expedition. The various periodical publications have been continued, and many volumes have been bound. Shelf-room is much required, and the attention of the Council will have to be directed to the enlargement of the Library very shortly.

"The following books have been presented: 'The Liberty of Independent Historical Research,' by the author, Mr. Thomas Kerslake. 'Proceedings of the Royal Geographical Society,' by Mr. W. Square. 'Histories of Launceston and Dunheved,' by R. and O. B. Peter, by Mr. R. N. Worth. Twenty-four Volumes on Astronomical and Mathematical Subjects, by Mrs. Gibbons. Six books on Philosophy, by Mr. Thomas Harper. 'Sketch of the Life of William West,' by the author, Mr. R. N. Worth. 'Two hundred and Seventy-two Antiquities, &c., near Penzance,' by the author, Rev. W. S. Lach-Szyrma. 'Classified Index to the Transactions of the Devonshire Association,' by the author, Mr. G. W. Ormerod. 'Registers of St. Columb Major, from 1539 to 1780,' by the author, Mr. Arthur J. Jewers.

"The following books have been purchased: 'Phillips's Manual of Geology,' new edition, 2 vols. 8vo. 'Philosophical Magazine,'

1885. 'Annals and Magazine of Natural History,' 1885. 'Entomologist's Monthly Magazine,' 1885. 'Journal of Botany,' 1885. 'American Journal of Science,' 1885. 'Western Antiquary,' 1885. 'Zoologist,' 1885. 'Nature,' 1885. 'Geological Magazine,' 1885. 'Folk Lore Journal,' and Publications of Folk Lore Society, 1885. 'Ibis,' 1885. 'Entomologist,' 1885. 'Mind,' 1885. 'Grevillea,' 1885. 'Quarterly Journal of Microscopical Science,' 1885. 'Journal of Anatomy and Physiology,' 1885. 'Proceedings of Royal Society,' 1885. 'Annales des Sciences Naturelles,' 1885. Publications of Early English Text Society, 1885. 'Reports on the Scientific Results of the Voyage of H.M.S. *Challenger*,' 4to. 'Yarrell's History British Birds, new edition, complete. 'Buckler's Larvæ British Butterflies,' Ray Society. 'Zoological Record,' vol. xxi. 'Publications Palæontographical Society,' vol. xxxix. 'Fauna and Flora Gulf of Naples,' vol. xiii. 'Journal Anthropological Institute,' 1885.

"The following have been presented by the various Societies : 'Atti della Societa Toscana,' 1884-85. 'The Journal of the Royal Microscopical Society,' 1885. 'Proceedings of the Zoological Society,' 1885. 'Quarterly Journal Geological Society,' 1885. 'Proceedings of the Geologists' Association,' 1885. United States Geological Survey—"Third Annual Report;" 'Geology of the Comstock Lode,' Becker; 'Atlas of the Comstock Lode,' Becker; 'The Copper-bearing Rocks of Lake Superior,' Irving; 'Comstock Mining and Miners,' Eliot Lord; Bulletins 2 to 14; 'Older Mesozoic Flora of Virginia,' Wm. Fontaine; 'Silver Lead Deposits of Eureka,' J. Storey Curtis; 'Palæontology of the Eureka District,' C. D. Walcott; 'Fourth Annual Report." Smithsonian Institution, Washington—"Annual Report of Controller of the Currency,' 1885; 'Annual Report,' 1883; 'Report National Academy of Sciences,' 1883; ditto, 1884; 'Proceedings National Academy of Sciences,' vol. i. part 2; 'Memoirs National Academy of Sciences,' vol. iii. part 1. 'Journal Royal Institution of Cornwall,' vol. viii. part 4. 'Transactions and Proceedings Botanical Society of Edinburgh,' vol. xv. part 2. 'Annales des K. K. Naturhistorischen Hofmuseums,, 1885. 'Journal Royal Geological Society, Ireland,' vol. vi. part 3. 'Report of Trustees Australian Museum, 1884, new series. 'Report and Transactions Devonshire Association,' vol. xvii. Ditto, extra vol. 'Devonshire Domesday,' part 2. 'Journal and Proceedings Royal Society

New South Wales,' 1884. 'Proceedings Manchester Literary and Philosophical Society,' 1884-85. 'Geological Society of Russia,' No. 93, 1885. Geological and Natural History Survey of Canada—'Reports,' 1882, 1883, 1884; Maps accompanying ditto; 'Catalogue Canadian Plants.' 'Scientific Transactions Royal Dublin Society,' vol. i. ser. 2. 'Report and Proceedings Manchester Scientific Students' Association,' 1884. 'Somerset Archæological and Natural History Society,' 1884. 'Proceedings Bristol Natural History Society,' 1884-85. 'Report and Transactions Penzance Natural History Society,' 1884-85. 'Seventh Annual Report Dulwich College Science Society.' 'Report British Association,' 1884. 'Transactions Royal Geological Society of Cornwall,' 1884. 'Scientific Proceedings Royal Dublin Society,' 1884-85. 'Scientific Transactions Royal Dublin Society,' 1884-85. 'Journal Royal Institution of Cornwall,' 1885. 'Proceedings Natural History Society of Glasgow,' 1882, 1884. 'Fifty-second Annual Report Royal Cornwall Polytechnic Society.'

"Your Curator hopes to be able very shortly to communicate to the Council a proposal for the presentation to the library of a large and valuable collection of Devonshire tracts and pamphlets."

The Curator of Anthropology reports:

"The collections in my charge are in good order, but very few additions have been made to them during the past year. The head of an Egyptian mummy, a one-pound bank note, and a curious conch shell, the latter formerly used on board a Plymouth trawler as a 'fog signal,' are among the presentations to my department."

The report of the Curator of Mammalia is embodied in his notice of Cetaceans in the vicinity of Plymouth, pp. 314-317.

The Curator of Birds reports:

"During the past year a very good Emu's egg, from New Zealand, has been given by Mr. Webb, and a fine specimen of the Whooper Swan (*Cygnus Musicus*), shot in the locality, presented by Mr. J. T. Fouracre. A collection of more than one hundred birds has been acquired by the kind bequest of the late Rev. Alan Furneaux, of St. Germans. The birds, originally collected by the late Captain Creyke, R.N., were for the most part shot in the neighbourhood, and number among them many rare kinds, of

which the following are new to the Society's collections; viz., the Nutcracker, Roller, Goshawk, Wilson's Petrel, Buff-breasted Sandpiper, Stilt, Steller's Western Duck, and Little Egret. The greater part of the birds are well preserved, and some of them exceptionally well set up. The collection forms, in a word, a valuable present. The Curator hopes, if possible, to present a catalogue of the birds by next year.

"The Entomological Curator reports the undermentioned additions to the collection under his care during the past year.

"One *Sphinx convolvuli*, a fine specimen, and in good condition, presented by Mr. F. Brent, F.S.A.

"Specimens of Parasitic Hymenoptera. A case illustrating the life history of *Abraxas grossulariata*, with its parasites and hyperparasites.

"A case containing the Mulberry Silkworm—egg, caterpillar, cocoon, pupa, and moth, with the silk in different stages, presented by the Curator."

The Curator of Botany reports:

"I have continued the stock-taking of the specimens in the Herbarium, indicating on the printed slips pasted on the covers of each packet those specimens that are present.

"Next year, if I continue in office, I hope to be able to give a complete census. Practically speaking, every rare local species is represented; but many common species, as reported last year, are unrepresented.

"On the afternoon of the 10th of June last a botanical excursion to the Seaton Valley and Estuary, near Downderry, took place under my guidance. Eighty-one species of plants were noticed, of which the most interesting were: *Aquilegia vulgaris* (Columbine); *Silene inflata* (Bladder Champion); *Silene maritima* (Sea Bladder Champion); *Lychnis flos-cuculi* (Ragged Robin); *Lychnis diurna* (Red Champion); *Honckeneya peploides* (Sea Purslane); *Sambucas nigra* (Elder, a variety with variegated leaves); *Sherardia arvensis* (Field Madder); *Senecio aquaticus* (March Ragwort); *Menyanthes trifoliata* (Buckbean or Bogbean); *Convolvulus soldanella* (Sea Bindweed); *Orobanche amethystea* (Bluish Broom Rape); *Melittis melissophyllum* (Bastard Balm); *Beta maritima* (Sea Beet); *Orchis mascula* (Early Winged Orchis); *Orchis latifolia* (Broad-

leaved Marsh Orchis); *Tamus communis* (Black Bryony); *Equisetum palustre* (Marsh Horsetail). It was too early in the year for many of the interesting marsh plants of the neighbourhood to be in flower."

The Curator of Mineralogy reports :

"A specimen of native gold from North Molton, Devon, has been presented. We are still in want of many minerals, and I shall be glad to receive contributions of any specimens; for even if they happen to be duplicates they will enable the replacement of those already in the collection by better examples, or the exchange for those still wanted. I hope, in the course of the ensuing year, to be able to complete an intended revision of the whole collection."

The Curator of Geology reports :

"Among the additions to the collection during the past year are the caudal vertebra of a whale, found in Notte Street, Plymouth, presented by Major Daubeney; part of a femur of rhinoceros, from the Oreston Caves, presented by Mr. Henry Hodge; and sections of trees, from the Submarine Forest of Porth Mellon, presented by Mr. Matthew Dunn."

"The Curator of Petrology has much pleasure in reporting considerable additions to his department during the year. Not only have there been many interesting and valuable presentations; but as a result of his field-work during the past season, the Curator has himself been enabled to add a large number of specimens, which makes the collection the most complete and varied display of local rocks in the West of England. The leading features have also been carefully studied, and it is hoped that during the coming year the present provisional arrangement may give place to a detailed scientific classification. As one of the most interesting additions may be noticed a set of specimens from the Submarine Triassic Outlier in the Channel off the Lizard, the existence of which your Curator had the good fortune to be the first to ascertain and announce."

JAMES C. INGLIS,
H. PENROSE PRANCE, } *Hon. Secs.*

Dated March, 1886.

METEOROLOGICAL REPORT.

SUNSHINE IN PLYMOUTH FOR 1885.

MONTH.	Sun above the horizon		Sun shone in Plymouth		Percentage actual was of possible.	No. of days no sun-shine.
	hrs.	min.	hrs.	min.		
January	260	17	...	28 40	...	11·0 ... 19
February	277	26	...	48 50	...	17·6 ... 13
March	364	14	...	138 40	...	38·10 ... 7
April	409	27	...	172 15	...	42·1 ... 3
May	473	46	...	162 15	...	34·3 ... 3
June	484	2	...	204 10	...	42·2 ... 10
July	486	49	...	236 20	...	48·6 ... 5
August	441	52	...	215 45	...	48·8 ... 0
September	372	52	...	135 0	...	36·2 ... 3
October	326	20	...	96 20	...	29·5 ... 7
November	264	11	...	41 5	...	15·5 ... 18
December	244	15	...	50 10	...	20·5 ... 17

The sunshine for the year was 32 per cent. of that possible, or he shone in Plymouth for nearly one-third of the time he was above the horizon; whilst on 105 days he did not appear. The temperature for the year has been below the average, chiefly caused by colder days; but the nights, too, have been colder than the mean. The freezing point in the screen was reached on twenty-five nights, ten of which occurred in January, nine in December, and one as late as April 5. Rain fell on 199 days to the amount of 34·57 inches, which is about 95 per cent. of the average, but the number of rainy days was 6 per cent. more than the mean. The days on which we experienced the greatest rainfall were 21st May, when 1·05 inches fell, and on 2nd September, when 1·02 inches fell, and these were the only days when the rainfall exceeded one inch in the twenty-four hours. The greatest atmospheric pressure for the year was 30·579, on December 23rd; the least was 28·878, on October 10th; and it fell below twenty-nine inches also on January 31st. The highest temperature for the year in the shade was 81·2 deg. F. on July 27th; the lowest temperature in the screen was 22·5 on December 11th.

COLD MONTHS.—January, March, April, May, June, July, August, September, October, and December.

WARM MONTHS.—February and November.

WET MONTHS.—April, May, September, October, and November.

DRY MONTHS.—January, February, March, July, August, and December.

The year on the whole has been dry, and the amount of rain during the time of falling has been light. North-easterly winds have blown in greater proportion than the average, and there have been nearly double the number of calm mornings. South-westerly winds have been much below the average. There have been no long periods of drought nor rain. Gales occurred in Plymouth on the 31st January, 2nd and 21st February, 24 and 25th April, and on the 17th and 28th November, and in some parts of the British Isles much damage was done. Thunderstorms were observed on 31st January, 4th and 22nd May, 4th June, and 6th October. No snow has lain on the ground in Plymouth for the year, and the only snow was a few flakes in December. There have been a large number of mornings on which fog has prevailed.

An ABSTRACT from the METEOROLOGICAL REGISTER, from 1st January, 1885, to 31st December, 1885, kept at the Navigation School, Gascoigne Place, Plymouth (Lat. $50^{\circ} 22\frac{1}{2}'$ N., Long. $4^{\circ} 7\frac{1}{4}'$ W.), by JOHN MERRIFIELD, LL.D., F.R.A.S., F.R.M.S.

MONTH.	BAROMETRICAL PRESSURE REDUCED TO MEAN SEA LEVEL AT 32° FAH.			TEMPERATURE.			HYGROMETER.				RAINFALL.		DIRECTION OF WIND AT 8 A.M.				
	Average Barometer for Month.	Maximum for Month.	Minimum for Month.	Average Maximum in shade.	Average Minimum.	Average temperature.	Average dry Bulb.	Average wet Bulb.	Average dew Point.	Average humidity, saturation, 100.	No. of days on which not less than .01 in. fell.	Quantity for the month in inches.	From N. by E. to N.	From E. to S. by S. to W.	From S. to W. by W. to N.	From N. to N. by N. to E.	Calm.
1885																	
January .	29.856	30.434	29.894	40.09	36.29	38.19	41.85	40.72	39.36	91	18	2.36	8	10	6	1	6
February .	29.673	30.146	29.032	50.56	41.37	45.96	44.88	44.06	43.08	93	19	3.25	2	6	17	2	1
March .	30.080	30.528	29.347	49.76	37.34	43.55	41.16	39.15	36.64	84	11	1.53	10	3	3	7	8
April .	29.787	30.321	29.170	53.29	39.70	46.50	45.90	44.03	41.88	87	15	3.28	7	5	3	8	7
May .	29.813	30.161	29.328	56.76	43.51	50.14	49.75	47.85	45.85	87	25	3.55	2	7	12	8	2
June .	30.043	30.377	29.667	65.59	52.04	58.82	58.70	55.12	51.90	79	11	1.95	8	8	1	7	6
July .	30.195	30.358	29.881	69.68	54.12	61.90	61.66	58.41	55.60	81	9	0.42	8	0	7	8	8
August .	29.973	30.316	29.648	67.54	51.52	59.53	58.84	56.18	53.79	84	10	2.11	10	3	5	6	7
September .	29.909	30.313	29.522	62.20	49.19	55.70	54.82	53.74	52.66	92	22	4.39	3	2	13	7	5
October .	29.741	30.153	28.878	54.33	41.96	48.15	46.88	45.80	44.61	92	27	5.40	7	2	6	13	3
November .	29.846	30.300	29.246	51.73	43.06	47.39	46.45	45.44	44.33	93	17	4.24	12	4	6	4	4
December .	30.244	30.579	29.438	46.99	36.17	41.58	40.08	39.05	37.71	92	15	2.09	9	3	6	1	12
Average for 1885	29.930	30.332	29.337	55.71	43.86	49.78	49.25	47.46	45.62	88	199	34.57	86	53	85	72	69
Average for 21 Years . .	29.950	30.398	29.318	57.83	44.94	51.48	50.56	48.67	46.78	87	187	36.30	0.87	62.5	104.1	83.8	36.8

The observations are all made at eight a.m. The Rain Gauge is by Casella, and is 8 inches in diameter; its top 9 feet 2 inches above the ground, and 75 feet above the mean level of the sea. A rainy day is one in which not less than 1.100th of an inch falls. The instruments have all been supplied by the Meteorological Committee of the Royal Society, compared at Kew, and the index error supplied to each.

ADDRESS

AT THE OPENING OF THE SESSION 1885-6.

BY W. SQUARE, F.R.C.S., F.R.G.S.,

President.

LADIES AND GENTLEMEN,—

In opening this, our seventy-third session, I must first of all thank you for the honour you have done me in electing me your President. To anyone with the smallest aspirations to Scientific knowledge, the occupation of a chair like this must be a great gratification.

We are a Literary and a Scientific Society, and so I choose the Scientific part, and wish to frame my Address upon that basis. No such Address could commence without a definition. I therefore should define Science as “knowledge brought to order.” Society contains two classes of individuals. The first, those who want to know; and the second, those who do not. I take it that we members of the Plymouth Institution belong to the first class. Those of the second class we may relegate, as worthless, to oblivion. Those of the first class—ourselves—we may divide into (non-politically) Tories and Radicals. I use the terms advisedly, as they mean a great deal. There are Tory Scientists who fear the march of knowledge, because some pet theory of their own (probably outside the range of legitimate Science) is disturbed by it; and there are Radical Scientists who care for nothing as long as their enormous appetite for knowledge is satisfied.

The world did not come by chance. It was made. And it is about the laws that govern it, and the making, that Radical Scientists think.

The actions and thoughts of the pre-historic savage we can know little about, as he has left but few marks, except in the way of implements of hunting and warfare. But he is invaluable to the Geologist, as marking the era in which we believe man made his appearance on our earth. We trace man through his various conditions so well known here, his flint implements of our own Museum beginning his history, and the gradual elaboration of these of course reaching up to our own times.

We have no absolute proof of the commencement of Scientific thought, but I think the majority of us will locate its birth in Egypt. From the seat of Government every year the Pharaoh of the time went in grand state to the Temple of Philæ to consult the Great Nilometer. He was met by the priests of his day, and with their aid, with many superstitious rites, was able to predict the price of corn in the coming autumn.

This curious ceremony laid the foundation of exact thought. The Nile rose to such a height; hence the price of corn. This knowledge soon spread from the Pharaoh to the people, and the Science of the rising and falling of the Nile became an accomplished fact. Later in Egyptian times came the knowledge of eclipses, transits of Venus, and various astronomical circumstances that now are well-known observed facts, and these must probably have caused the same heart-burnings that advanced Scientific thought does now.

But the great idea, that real knowledge must in the end win, has been the hope of the inmost soul of every real Scientist since the world began. After the first few strides (which may have taken almost infinite time), ideas came to be jotted down on stones, walls, pyramids, and such lasting monuments, that, though thousands of years have past, the writing of these early sages is still fresh and new. But by far the majority of the records of these early times unfortunately deal with a class of theology only, with which we have little to do. Isis, Osiris, and Horus, Bubastis, Prosopis, and Menephtha, are interesting, but have little connection with the march of knowledge. In common with the same conditions of later date, it is probable that they retarded rather than advanced the progress of thought.

Greek Philosophy rose and fell, and did little for Science. It was divided into two parts—the Greek Age of Faith, and the

Greek Age of Reason. In both conditions accurate thought was out of the question. Though we admire greatly Socrates and Plato, we cannot say that we gained substantial *Scientific* good from them. It is not until we arrive at the age of Aristotle that lasting benefit to Science accrues.

Military order now filled the arena. The march of Alexander, the armies of Xerxes and Darius, swept the world, but no access of knowledge directly came. It was the individual who thought, worked, and jotted down his thoughts, who was the precursor of the men that must eventually rule the world. For ages now our History of Science is so meagre as almost to be a blank. The History, I say; for the facts known must have been stored up in men's minds. What was the condition of thought of the Period?

The earth was flat: old Oceanus rolled round it; the azure vault of heaven was a dome to cover it; the Sun was the god of all, the Moon his spouse, the stars his sons and daughters. The gods dwelt in Olympus above, and had the same passions and thoughts as men. Men died and passed to Hades below, and around the vault to the Olympian fields or to Læthe. Everything was Anthropomorphic. This vulgar condition of Theism has been what the unlearned, for their convenience, have struggled to perpetuate. This vulgar condition has been what it has been the perpetual struggle of the Scientist to overthrow. After sojourns in various lands, the old country, Egypt, again becomes the centre of Scientific thought, and the foundation of the Library of Alexandria becomes one of the principal landmarks.

The names of such men as Ptolemy Soter, his son Philadelphus, Demetrius Phalareus, Eratosthenes, Apollonius Rhodius, Hipparchus, and Archimedes will show at once the character of its foundation. Far in advance of even the Middle Ages, it contained the demonstration of the globular form of the earth by Eratosthenes, the fire-engine of Ctesibius, the steam-engine of Hero. The works of Euclid were on its shelves, containing problems which as long as the world lasts, and afterwards, will be held as absolutely incontrovertible.

The Serapion, a sort of annex, contained water-clocks and exact instruments, which were the heralds of the downfall of Superstition and Bigotry.

But military troubles, the curse of the world, interfere again, and by the order of the great Cæsar the knowledge collected for centuries is dissipated in a day, and the great Library of Alexandria is a thing of the past. Civilization was put back hundreds of years. Stored-up knowledge, that even now might solve problems, was used as fuel for baths, to wash the outside dirt off bigots and ruffians, who wanted the ablution applied to their besotted minds. But let us skip a horrid period of darkness, during which knowledge and exactitude of thought travelled into Spain, when the Arabs, Moors, and the Jews (a thinking race) held the Science of the world.

All the knowledge of mathematics and medicine seems at this time to have been absorbed by the Jews. One Jewish physician, resident in Spain, objected to visit the Khan of Bokhara although offered a fabulous fee, because he could not leave his library, and its transit would cost too much. The civilization of Spain must now have been far in advance of later times, and the schools of learning better endowed, and more efficient in their teaching. Whilst London and Paris were stinking villages, without any thought of sanitation, Granāda was lovely with its hanging gardens, scented fountains, beautiful architecture, and a degree of refinement demonstrated to us by the lovely views of the Alhambra.

And now we come by a strange irony of history to a time in which the very descendants of the men who destroyed that glorious repository of knowledge, the Alexandrine Museum, come to the front themselves, and start us on our career of present science. Galileo, Leonardo da Vinci, Columbus, Vasco de Gama, all bearing Latin names, are pioneers so near our own times as to be our bosom friends. Who does not know the story of the swinging lamp of Galileo, of the vacuum of Toricelli, and of the laboured thought which for the second time within historic times pronounced the world round? Yet, how few of us, who know these facts as children's tales, can understand the wealth of intellect that was used up to prepare them for our easy grasp.

Time prevents my going into an elaborate description of the Copernican system. It practically lays down the same laws that we have to day. At this period the whole condition of Scientific

thought was one great struggle against Bigotry. Galileo, when accused of heresy, recanted ; but when on his knees said to himself, "The world is round all the same." Accurate thought systematized is incontrovertible.

What a dreadful sight, Science, in the form of Galileo (recanting what he knows to be true), on her knees before the bigots of the Church ! Mind you, not before Religion ; for Science and true Religion have always been twin sisters.

Leonardo da Vinci was the wanted man ; he came apparently inspired, and grasped ideas and solved problems that ordinary minds would have quailed before.

Compared to Leonardo, Bacon was an obstruction, and not a light, in the path of Science. He actually went so far as to decry the value of scientific instruments, thinking our unaided senses the more accurate.

Leonardo had able helpers. Galileo, Toricelli, Castelli, Viviani, Borrelli, Gassendi, Michael Angelo, are names that can never be forgotten. It is curious to remark that most of these great men did not confine themselves to one thing ; most were poets, sculptors, painters, mathematicians, and even legislators, and in each branch foremost.

Now, in this fifteenth century, all old anthropomorphic ideas were disturbed, and a new era of scientific thought embarked upon. Mechanical ideas were applied to the motions of the heavenly bodies, and laws applied to them that were already known to be in force upon our earth.

But what a tremendous upset next occurs. The circumnavigation of the world by Magellan, and his lieutenant, Sebastian D'Elcano, made previous theories established facts. On September 7th, 1522, after a voyage of more three years, they completed their labours. They sailed more than 12,000 miles in the Pacific alone, and though reduced by famine and desertion to the utmost straits, stood firm to the theory of the sphericity of the earth.

From this time we consider the heliocentric condition of our system beyond dispute. In 1608 Lippenshaw accidentally discovered the telescope, which has been the foundation of all the "scopes" of to-day. Science now grew apace. Men cared not what others said or thought ; all wished to know.

The publication of Newton's *Principia* in 1687 laid foundations of scientific thought that have never been disturbed. To quote Professor Draper: "On the principle that all bodies attract each other with forces directly as their masses, and inversely as the squares of their distances, Newton showed that all the movements of the celestial bodies may be accounted for, and that Kepler's laws might all have been predicted—the elliptic motions, the prescribed areas, the revelations of the times and distances." As we have seen, Newton's contemporaries had perceived how circular motions could be explained. That was a special case; but Newton furnished the solution of the general problem, containing all special cases of motion in circles, ellipses, parabolas, hyperbolas—that is, in all the conic sections.

The Alexandrian mathematicians had shown that the direction of movement of falling bodies is toward the centre of the earth. Newton proved that this must be the case, the general effect of the attraction of all the particles of a sphere being the same as if they were all concentrated in its centre.

Newton's merit consisted in this, that he applied the laws of dynamics to the movements of the celestial bodies, and insisted that scientific theories must be substantiated by the agreement of observations with calculations.

Man ceased to be the centre of all things except to himself. Each one became an infinitesimal speck; the earth on which he lives only a slightly larger one, and only one of the incalculably numerous components of the universe.

The interest of Science, still greatly centered in the relation of our earth to other worlds, until the advent of the Herschels' mathematics applied to the stars, now became exact. Double suns are discovered, nebulae found out, and for the first time men believed that there were other suns than ours. The further problem of worlds fitted for habitation must be left to our own times.

One of the principal retardations of Science hitherto had been the theory of the emanation of light, instead of the ethereal undulatory wave theory. This was now broken down, and vast strides in scientific thought immediately resulted.

To give an idea to what a pitch accuracy of thought had arrived at this time, let me say that Römer fixed the passage of

light at the rate of two thousand miles per second, from his observations of the obscurations of the satellites of Jupiter—not a bad estimate. In 1727 Bradley determined it by the aberration of the fixed stars at almost the same; whilst within our own times Foucault and Fizeau, by rotary mirrors and wheels, have confirmed these astronomical observations.

But Science in its true sense was expanding. It spread to Germany, Denmark, Holland; and in England Harvey discovered the nature of the circulation of the blood.

Henceforth Science is not limited to one set only of observers, but is divided into innumerable sections. It is true that the study of the vast was the incentive to accurate thought; but the study of the minute has since become equally important. Various laws and theories were propounded and discussed, and we now arrive at the period of our own century.

And let us pause for a moment to see what was going on. We English were not in Science the foremost nation that we are now, or rather among the foremost.

Patronage was not extended, as it now, to scientific men. There were then no Cosmo, no Lorenzo de Medici, such as helped on the great Florentine schools. The Court was too besotted to understand that anyone could wish to learn, and the majority of those who had money spent it on their own pleasures.

But with the era of the last generation springs up a better condition of thought. Longing to know spread over the great middle class, who are in Science the great backbone of the world. Fast came the perfection of the telescope, then the steam-engine, electricity, the microscope, and all the wonderful discoveries of Chemical Science. To give one instance of the accuracy and march of thought in this branch (Chemistry), let me explain the idea now held of one great period of our earth's history to show how the balance is held. We believe the major part of the phenomena of Creation to be attributable to the consistent and persistent cooling of the earth's body. Take then a period in which, though still hot, cooling is proceeding. It is the Age of Trees. Dank vegetation covers all the earth. To render this possible, the steamy atmosphere must be loaded with carbonic acid. It is the office of the trees to alter this (as they do in a minor degree to-day) into oxygen fit for the mammalian inhabitants

of the world to breathe. Hence the enormous deposits of carbon, and the formation of the coal measures.

But more of the world was sea than land, and this had to be compensated for. The carbonate-of-lime burdened sea gave up its carbon, the air becoming clearer, and limestone rocks, principally through the action of low forms of animal life, are formed coeval with the Coal.

Amongst the last great discoveries the Spectroscope chimes in. Fraunhofer finds his lines, and Angstrom reduces them to order. Oh, if poor Galileo could have heard the tale (I must believe he has), that it is proved to the satisfaction of the obtusest idiot that by the revelation of that wonderful set of prisms the chances are sixty-seven billions to one that there is iron in the Sun, a body ninety-one millions and odd miles away!

On this also hangs part, great part, of our knowledge of the rate at which stars move about. The so-called fixed stars are no more fixed than we are. Sirius, our nearest friend, is parting company at the rate of twenty-seven miles per minute, and yet strangely we do not notice it. This has been determined by the law laid down by Huggins of the variation of the F line of Hydrogen in the gas streams of the sun, the rate being eight geographical miles per second. It was he and Zèndorf that first considered the spectrum of the corona during eclipses, and first detected and observed the great gas streams of incandescent hydrogen. This was soon applied to other bodies, especially the nebula of Orion. The discrimination between the continuous and the discontinuous spectra of nebulæ, as regards their constitution, laid down the first great laws and thoughts of the primary nebulous constitution of all planetary systems.

Geologic thought occupied men's minds. They began to think about and systematize the various strata of the earth.

They find that stones are carried about by glacial force; that sea-shells are found on lofty mountains, because the mountains have risen out of the sea. They make blunders, acknowledge them, and rectify them, and find that for Nature's operations even our little world wants almost infinity of time.

Geologic thought has done one thing that even our fathers would have derided. The Patristic chronology laid the date of the appearance of man on the earth at six thousand years ago. But man has outlived the great European Glacial period. His

remains are found, even in this country, mixed with the cave-bear, lion, and hyæna; the hippopotamus, mammoth, rhinoceros tichorhinus, bos primigenius, &c. And there is evidence that we must relegate our ancestors to the later Eocene period; whilst from remains of spears and hunting implement, we judge that there must have been mighty hunters, veritable Nimrods, in Pleistocene times. All this must put back the date of the advent of man at least a quarter of a million of years.

One thought, so great that I cannot pass it over, comes from the Spectroscope. We can observe suns millions, hundreds of millions, of miles away, and find that it is far more than probable that if the inhabitants of their planets could view us spectroscopically, they would observe the same characteristics we view in them. The same common elements—Oxygen, Hydrogen, Nitrogen, Carbon, Sodium, Potassium, &c., would show out their well-marked Fraunhofer lines.

If this be so, is not the Universe made for man? May not Scientists indulge in the thought brought to us in one of our childhood's books—*Evenings at Home*—in the transmigrations of Indur, that there is reserved for those who strive to learn an abundant and constantly progressing harvest of knowledge in some other sphere in the grand hereafter! It would seem folly to waste the grand material (for such I must call it) of the human mind in anything but progressive conditions.

But whilst this thought towards other worlds was going on, thought about our own bodies and their betterment was putting a spoke in the wheel of the field of such thought.

Anatomy and Physiology sprung up as accurate sciences. The improvements in medicine and surgery, hygiene and dietary, that were the outcome, made men and women able to work and think better, and life was made longer. Contrasted with two hundred years ago, everybody lives on an average 13·3 years longer than then.

The invention of vaccination by Jenner, and the consequent decrease of consumption is amongst the foremost of causes.

Observe how, through want of Scientific thought, the people suffered in times gone by. Think of four hundred years ago in England, when many other countries were as luxuriously living

as we do now. Æneas Sylvius, afterwards Pope Pius II., has left an account of his journey through the British Islands, about 1430. He describes the houses of the peasants as made of stone without mortar; the roofs were of turf; a stiffened bull's hide served for a door. The food consisted of coarse vegetables, such as peas, and even the bark of trees. In some places they were unacquainted with bread. Contrast this with the progress made up to Queen Anne's time, when again we have a reliable historian. It had been so little, that the Queen, in 1704, in going to Portsmouth from London, now a journey of a few hours, had the royal carriage twice upset in the mud, and saw bands of robbers, wild boars, and red deer. The roads were mere tracks full of mud, even in the summer. Shade of Macadam!

Hence in modern times our differences in the breed of horses. Whilst all heavy goods were carried by the pack-horse, the breed maintained its broad, strong back, and short sturdy fore legs; but when roads became better, and pace was needed, longer legs and slighter bodies became necessary; hence the present condition of horses was determined by the road—a first-class modern instance of the survival of the fittest.

But all other methods or systems of Scientific thought pale before that great discovery of the nineteenth century—the Darwinian Theory. Laughed at, sneered at, snubbed, it has slowly made its way. Slightly altered, it is now the accepted doctrine of its first most bitter opponents. It preaches emphatically Law. That Nature has been arranged by Law. That the Law being made, the outcome was certain; and that there never has been, is, or can be, any deviation from Nature's Law.

But in these latter days, if Darwin worked at the vast and propounded the enormous theory of Evolution, there is another man still alive who worked at the infinitesimal, and has done more solid good to the human race and its congeners than almost any other. I speak of Louis Pasteur. First discovering the dysymmetry of the crystals of paratartrate of potash, he worked out the laws of symmetry in the inorganic world. Passing to the organic he laid down the laws of ferments. He found out and classified the diseases of wines and beers—a small thing, one may say, but the foundation of a theory that is in the future to regenerate the whole of the curatives of disease. He next

showed how to cure the peltrine and flacherie of the silkworm ; and by indicating the cure, showed how to save the industries that were worth to Europe millions of pounds. But not satisfied to stop at this condition of lower life, after a painful time of inertness due to disease, he attacked the dire complaint *fièvre charbonense*, the splenic fever of Russia. His experiments on animals, by means of mitigated inoculation, and his microscopic experiments, have reduced the cattle and sheep death-rate about ninety per cent. He has saved the Continental thinking-farmers millions of pounds. Fowl cholera and chicken croup he has almost extirpated, and now hopes—and I think with reason—to get rid of hydrophobia.

Following in his footsteps, Dr. Ferran hopes to extirpate, or at any rate to successfully combat, Asiatic cholera. So the following generations must progressively benefit by the first discovery of the immortal Jenner.

In Physiology the discovery of the law of osmosis is one of the grand moves in our century. The fact that an animal membrane welted on both sides, and having on either side fluids of different densities, offers no obstacle to their complete mixture, has laid the foundation of research in all matters having to do with the phenomena of digestion, respiration, and the general passage of fluids through the tissues of the whole animal economy.

The discovery of the laws of the correlation of the vital forces has also proved one of the most brilliant triumphs of our time.

Within the last few years we have the invention of the freezing microtome, now within the last few months made so easy by the substitution of bichloride of methylene for ordinary ether. One other discovery, not only useful in physiological experiments, but also for some painless surgery, is that of hydrochlorate of cacaine, for the production of local anesthesia.

It is impossible to even note all advances ; their name is legion, and I regret I have had only space to give what I call samples. The advancement of the accuracy of instruments is marvellous. Pasteur has found out his wonders by the aid of the improved microscope. The plunging of the object glass into the fluid that contains the specimen, and the elevation of the microscopical power, must have enormous value. The art of grinding glasses,

both for telescopes and microscopes, and prisms for spectroscopes, has lately been wonderfully advanced.

One of the later adjuncts to scientific research that has accrued to Plymouth, has been the promise of the foundation of a Marine Biological Laboratory. We look forward hopefully to great results.

The future then of Science will be the searching out of Nature's Laws, so living as not only to get the greatest amount of happiness out of this life, but also to carry out a better law, and enable others to do the same.

To do this, we can easily sum up that to do our best (we use the words of the poet Thomson) we

“Look through Nature up to Nature's God.”

Obituary Notices.

LIEUTENANT-COLONEL HARDING.

WILLIAM HARDING was born 18th August, 1792. He was the third son of Robert Harding, Esq., of Upcott, by Dionysia, daughter of Sir Bouchier Wrey. The army being chosen for him as his profession, he while quite young saw much service, and was actively engaged in many of the battles ending with Waterloo, holding rank as lieutenant and ensign in his regiment. After his retirement he joined the North Devon Militia, and became Colonel in the corps. He took an active part in county business of all kinds, as well as in political matters, and was foremost, until incapacitated by age and failing strength, in good works of various kinds. He took a warm interest in everything connected with the history, antiquity, and natural history of Devon, and he was a member of most of the literary and scientific societies of the county. To the *Transactions* of the Exeter Diocesan Architectural Society he contributed several valuable papers, and in 1845 he published the first volume of a *History of Tiverton*, and the second followed in 1847. He was elected a corresponding member of our Society in 1856, and our museum is enriched by his gift of a valuable series of the Carboniferous fossils of North Devon. He died on the 13th January, 1886, in his ninety-fourth year, and was buried at Pilton.

CHARLES WILLIAM PEACH, A.L.S.

The death of Charles William Peach, A.L.S., in his 86th year, has removed a most zealous and hard-working man of science from the list of corresponding members, and one who had endeared himself to the older members of the Plymouth Institution by his enthusiastic and lovable nature while resident in the adjacent county.

Mr. Peach was born in the year 1800 at Wansford, in

Northamptonshire, where he lived till early manhood. His birth-place being on the outskirts of the Bedford purlieus, one of the great English forests, he became passionately addicted to field sports, and there can be no doubt that the keen powers of observation developed in the pursuit of sport stood him in good stead when in after years his mind was directed to the more noble pursuit of science. Having joined the coastguard service while still a young man, he was stationed at various places on the east and south coasts of England. Those were the palmy days of smuggling, and Mr. Peach, who was always an indefatigable officer, had many hand-to-hand encounters with some of the most desperate characters engaged in the lawless traffic. It was while stationed at Cromer, in Norfolk, that his attention was first attracted to the objects cast up on the beach. The living marine animals and algæ, on the one hand, led him to study marine zoology and algology; while, on the other hand, the remains of the extinct mammalia exposed by the sea from the Cromer Forest bed naturally aroused him to the study of palæontology. To all these branches of science he afterwards made many valuable contributions. These studies brought him into contact with other workers in the same fields—in zoology, Darwin, Milne-Edwards, Edward Forbes, Allman, Owen, Huxley, Wyville Thomson, Bowerbank, Alder, Hincks; in algology, Harvey and Mrs. Greville; in geology and palæontology, Buckland, De la Beche, Murchison, Lyell, Hugh Miller, Nicol, Geikie, all of whom were more or less indebted to him for direct help in their researches, as reference to their works will fully bear out. Many of his discoveries, especially his earlier ones, were first announced by him before the British Association.

It was while stationed as Riding Officer of the Customs at Gorran Haven and Fowey, in Cornwall, that Mr. Peach did the admirable work that led to his election as one of our corresponding members. He was the first man to find fossils in the quartzite of Gorran, and thus to settle the age of the Lower Silurian rocks of Cornwall. Numerous communications were made by him to the Royal Cornwall Geological Society, the Polytechnic, the Royal Institution of Cornwall, and our Society; and our museum is still enriched with some of his presentations. His great Cornish collection is, however, in the museum of the Geological Society at Penzance.

Mr. Peach eventually went to Scotland, being stationed first at Peterhead, and afterwards at Wick, where he made the acquaintance of Robert Dick, the Thurso baker and geologist. The account of their friendship and mutual studies is contained in some of the most interesting chapters in Dr. Smiles's *Life of Robert Dick*, part of which book is devoted to a biographical sketch of Mr. Peach. It was also while stationed in the North that he made the discoveries, at Durness and Assynt, of those fossils which are now our means of determining the geological age of the Sutherland rocks. Not only among scientific men had Mr. Peach a large acquaintance; but his genial and sympathetic nature attached to him also many men of literary pursuits, amongst whom was Lord Tennyson, a frequent guest in Mr. Peach's house at Fowey, in Cornwall, with whom he formed a lifelong friendship.

When he retired Mr. Peach settled at Edinburgh, where he died in March, 1886. English science has hardly a more remarkable example of its successful pursuit under difficulties. His duties were always with Mr. Peach the first consideration, and at no time of his life did his salary exceed £150, while in Cornwall it was but £75 with an allowance for a horse.

CONVERSAZIONE.

(1st October, 1885.)

For an account of this, see the Report of the Secretaries.

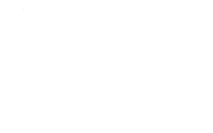
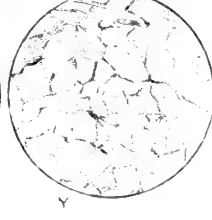
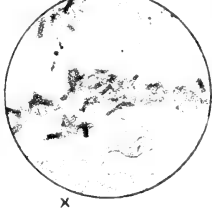
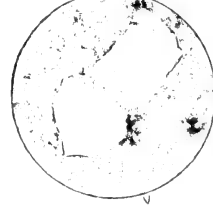
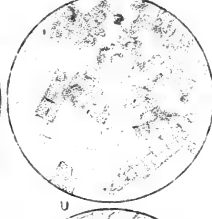
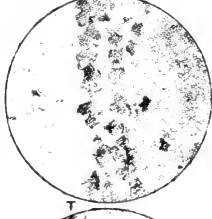
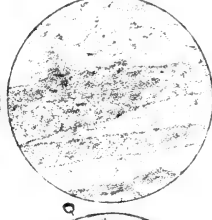
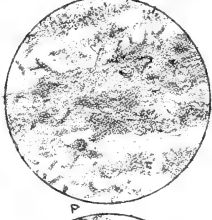
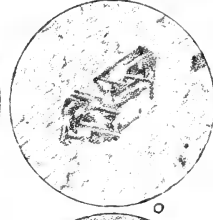
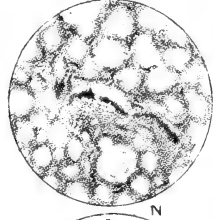
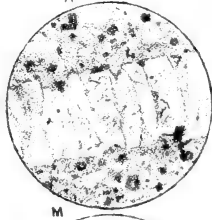
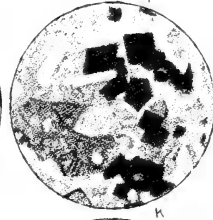
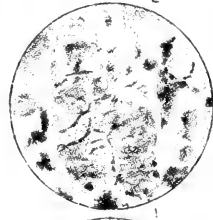
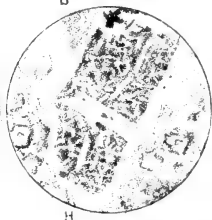
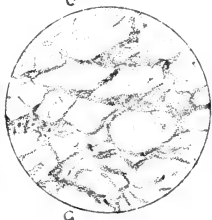
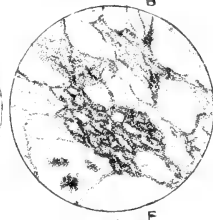
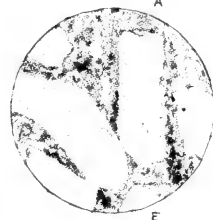
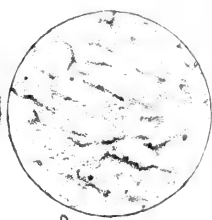
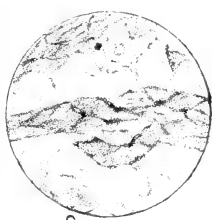
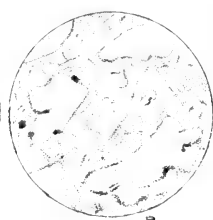
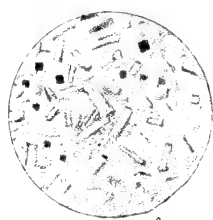
THEORIES OF MESMERISM AND COGNATE
PHENOMENA.

SYLLABUS OF PAPER BY J. RICE.

(Read 15th October, 1885.)

MESMERISM an ancient art. Its modern expositor, Dr. Anton Mesmer, a physician of Vienna. Mesmer's definitions. Those of later writers. All concurring that its phenomena are caused by "animal magnetism, *an imponderable fluid resembling the electric fluid.*" Issue joined here. Modern science repudiates "imponderable fluids," and acknowledges no electric *fluid*, but only electric *energy*. Question: Are mesmeric phenomena objective or subjective? The methods of modern mesmerisers. How far the operator's *will*, or any *force* supposed to reside in his organism, are causative factors? Analogy of the phenomena to trance and to the antics of the Jumpers of Maine.

Reichenbach's theory of "Od." Muscle reading. Thought reading. Nerve reading. Thought a special molecular condition of brain. The theory that such molecular condition may be transmitted from one brain to another by means other than the ordinary channels of the senses. The principles laid down as governing such transmission.



THE ROCKS OF PLYMOUTH.

BY R. N. WORTH, F.G.S.

(Read October 22nd, 1885, and January 21st, 1886.)

FOLLOWING up the work begun more than threescore years since by the honoured fathers of our local geology, the Rev. R. Hennah and Mr. John Prideaux, it has been my privilege from time to time to lay before this Society the leading features of the progress of geological science in the neighbourhood of Plymouth.

Since my appointment as Curator of Petrology in our Museum, I have been further engaged in endeavouring to bring together a complete collection of our local rocks (now numbering some thousand specimens), and my outdoor work in this direction has been supplemented by the examination of the most typical specimens acquired, by the methods of modern petrological science. I have therefore now to offer the Society some account of the "Rocks of Plymouth."

The present methods of petrological investigation are very different from those in use when, in 1830, Mr. Prideaux, in his "Geological Survey of some parts of the Country near Plymouth,"¹ gave a detailed description of thirty-eight examples of local rocks, chiefly drawn from the area between Cocks Tor and the Eddy-stone. He had little to guide him but exterior characters; and where the separate components of which the crystalline varieties were composed could not be distinguished by the naked eye, or at most by the hand lens, no other means of certain knowledge was open.

But it may be asked, "Is no aid to be derived from chemistry?" Not so much as might be imagined, unless the component materials of a rock can be isolated. A rock is an association of minerals. Definite forms and modes of association give rocks their distinctive

¹ *Trans. Plym. Inst.* vol. i. pp. 19-44.

characters. Minerals are definite combinations of elements. Chemical analysis tells us clearly enough what are the elements, and what their proportions, which go to form a mineral; and chemical analysis indicates what are the elementary bodies, and what their proportions, in the mixture of minerals which constitute a rock. But chemistry, save in rare instances, cannot say in what proportions these elements are distributed among the component minerals, and therefore what these minerals are.

The chief rock-forming minerals—taking the genera, and not the species—are various oxides of iron, olivine, enstatite, hypersthene, augite, hornblende, mica, felspar, and quartz. Excluding the oxides of iron (all of which contain iron and oxygen), every one of these minerals contains silica, and some of them notable quantities of alumina, magnesia, lime, potash, soda, or other alkalies. The same elements, differently proportioned, thus occurring in whole or in part in several associated minerals, no satisfactory information is obtained by mixed analysis. Moreover, there are minerals, practically identical in composition, which vary chiefly or wholly in their crystalline form. Calcite and arragonite have precisely the same components, and differ only in the fact that arragonite crystallizes in the rhombic and calcite in the hexagonal system. Neither the hand-lens nor chemistry, therefore, affords us direct aid in dealing with minutely-crystalline rocks, though by the use of specific-gravity solutions with powdered rocks, several minerals may be and are isolated for identification.

We owe the present position of petrological science to the microscope. Opaque and transparent are for the most part relative terms. The densest and most opaque rock, if cut into slices sufficiently thin, is transparent, or at the least translucent, and its structure and composition are then capable of examination in the fullest detail by various methods of microscopical investigation. Not only may the nature of the minutest components of a rock be ascertained, but the history of the rock, and the changes through which it has passed, may frequently be made out.

Without attempting further detail, I may add that microscopic petrology in its origin is purely English. Mr. H. Witham ground thin rock sections for microscopic examination, in the study of fossil plants, so far back as 1831. But the real father of this branch of science is Mr. H. C. Sorby; and it is not yet a quarter of a century since he commenced the microscopic study of purely

mineralogical and petrological questions by the preparation and examination of similar slides.

The present paper contains a description of the leading rocks in the neighbourhood of Plymouth, based not merely upon their general external characters, but upon an examination of a large number of microscopic sections, specially selected and prepared. This field of local scientific research has hitherto been practically untrodden, and I hope therefore that the results of the enquiry may be of some interest and value.

The title, "Rocks of Plymouth," must be interpreted somewhat liberally. My aim has been to deal with the more characteristic rocks of the district between Brent Tor and the Eddystone in one direction, and from Ivybridge to St. Germans in the other. The land area included within these limits would be some 350 square miles. It is not to be understood that the whole of this district has been minutely inspected, but that as far as possible all the leading varieties of rocks therein have been collected and examined. Within a narrower area, however, a much closer survey has been made. Every point of special interest between the Notter and the Erme, and within these limits from Dartmoor to the sea, has been visited; while for the more immediate vicinity of Plymouth itself the examination has been both close and protracted.

The different geological periods reviewed range between the Archæan, found in the Channel basin, and the Trias. Most of our area is occupied by Devonian strata, but on its northern boundary, near Brent Tor, there are Carboniferous. The granite is post-Carboniferous, and the Trias occurs at Cawsand, with a trace at Drake's Island. These are the stratigraphical divisions as commonly recognised. I have a very strong belief myself, however, that Silurian rocks are present in the metalliferous band of the Tavistock mining district, and am looking forward to a new Geological Survey on the 6-inch scale to solve this and sundry other local problems. In the very general absence of fossils over the greater part of the debateable area, petrology, by the careful analysis of lithological peculiarities, may render important aid.

The divisions adopted in this paper are not, however, stratigraphical. Mr. Prideaux used a mixed topographical and group arrangement, and classed his illustrations under six heads—granites of Dartmoor, rocks bordering the granite of Dartmoor, rocks

(primitive) not in contact with the granite, greywacke formation up to the limestone, rocks of the shore, and rocks of the Eddystone. No better course was open to him; but we can choose what may be called a structural-historical arrangement, and treat together all the rocks of similar origin and character under the following heads: Sedimentary, contemporary igneous, intrusive igneous, granites and elvans, altered rocks. But each head requires subdivision.

SEDIMENTARY ROCKS.

The stratified rocks of the district need not detain us long. They afford good examples of each of the great water-formed divisions—argillaceous, arenaceous, and calcareous, and that in some variety.

Slates.—The larger part of the area is occupied by clay-slates, more or less strongly marked by cleavage; really hardened clay, an indurated hydrous silicate of alumina. The varieties are very numerous. There are the hard, blue, finely-cleaved slates, well adapted for roofing purposes, of Cann Wood, and other localities; the loose, broken, subsoil slates, commonly known as “shillet”; soft drab or olive slates, which split into flakes of little tenacity; soft drab splintery slates; compact claret and green slates, well seen in the railway cutting near Mutley, which have all the appearance of a definite lithological horizon; and the more massive, brown, thickly-jointed, distinctly-charactered slate, which occupies a wide range to the northward, among the lowest of our local rocks. These slates range in hardness from varieties that ring under the hammer to others that will crumble between the fingers; in colour, from a dark-lead blue or ruddy-purple to brown, drab, olive, pale-green, grey, and ochreous-yellow; in texture, from finely-grained roofing material to a coarse sandy-shale, which marks at times the passage into sandstone; in structure, from the highly cleavable slate of Cann Quarry, to the junk-like, massive, rhombohedral-fracturing strata seen by the side of the Tavistock railway, near Bickleigh, Yelverton, or Horrabridge, and to the splintery fossiliferous band of Staddiscombe; in composition, from rocks of the normal silico-aluminous type to others largely charged with iron oxide, or, as frequently happens in the case of those immediately contiguous to the limestone, with calcareous matter. These, however, are rather to be regarded as

shales, though examples of slaty cleavage occur, as at Deadman's Bay, in the limestone itself, and in many of the ash beds. Some of these variations may be traced to locally-acting causes, others seem to have a wider origin.

Sandstones.—Our sandstones and grits lie mainly to the southward of the limestone band (treated under the next head), and may be followed, more or less consecutively, for several miles in an east and west direction. Less varied than the slates, they still have a wide range of character. A very fine-grained red sandstone is associated with the limestone, and was found in considerable quantity at the time of the excavation for the Victualling Office. The limestone bed locally known as "hard-head," and chiefly used for road metalling, contains a notable proportion of quartz sand.

Our most distinctive variety is the fine-grained, hard, micaceous sandstone of Staddon, chiefly dark-red, but in part grey. Passage rocks into this from the adjacent slates may be observed, in which sandy and clayey laminae alternate. The fact is important, as controverting the suggestion that these sandstones are unconformable to the rocks immediately around them. Sandstone beds of this series occur at Mount Edgecumbe, and continue on a western or north-western strike, the succession being kept up by coarser-grained grits, chiefly lilac, brown, or tawny. To the eastward the red hue is somewhat more persistent, but the general character of the succession remains much the same. Some of these grit beds are very compact. There is an exposure at the ferry near Newton Ferrers of a reddish-grey rock, which may fairly be called a quartzite. It shows small flecks of mica on the joint faces, and under the microscope is seen to consist almost wholly of closely compacted quartz grains, with a little interstitial matter containing iron.

These sandstones and grits are presumably all of Devonian age, with the possible exception of the fine red sandstone which fills some of the joints and cavities of the limestone—probably here, as at Torbay, a Triassic remnant. Be that, however, as it may, we have a distinct fragmental Triassic rock in a patch of conglomerate on the beach at Cawsand, in close association with the Triassic trap of that locality. There is evidence also of the extension of the Trias over a wider area in this neighbourhood, in a large block

of Triassic breccia, the cementing material of which is partly calcedonic, which I found at Drake's Island.

Inter alia, the variety of rocks at Drake's Island is something remarkable in so limited a space. Mr. Prideaux stated that it was dunstone or greywacke, which terms were used by him interchangeably, with a little elasticity, to indicate trappean rocks. Dunstone is the ordinary local name for our volcanic series, but greywacke was commonly employed by our older geologists as the name of a system, and was occasionally adopted by Mr. Prideaux in that sense. In addition, however, to the volcanic rocks which form the bulk of the island, and which range from the ordinary lava type to schistose ashes and slates charged with lapilli, we find limestone and sandstone and the breccia already named.

Limestones.—Our limestone rocks are rather organic than sedimentary—in the main a consolidated coral reef. The animal origin of this is readily apparent; and surrounding it are more homogeneous calcareous masses, produced by the waste of the reef and the redeposition of its particles, and frequently enclosing large quantities of shells. This limestone has undergone much change, and is now highly crystalline. It is jointed with considerable regularity, and on a definite system; is traversed by a number of caverns; and is in parts markedly dolomitic, containing considerable quantities of magnesia. There appears reason to believe that the black hue, characteristic of some localities, was originally due to the presence of carbonaceous matter; and carbonaceous films have been noted. It yields some of the most beautiful marbles in the kingdom.

The bulk of the Plymouth limestone forms a band stretching along the northern shore of the Sound, eastward from the Hamoaze at Devonport, to a little beyond Gore. There are several isolated masses, the largest that of Yealmpton, and others of less importance at Goosewell, Craza Mill, and Hessenford, besides such intermittent beds as occur between Batten and Bovisand. The patch at Mount Edgcumbe, at what is usually called Cremyll, is really a portion of the Plymouth band.

Mention has already been made of the "hard-head," as a kind of bastard rock between sandstone and limestone. The microscope shows the quartz grains in a fine calcareous matrix. There is also a passage observable on the verge of the ancient reef at

various points between the clay-slate and the limestone. Both these examples are probably mechanical admixtures, the result of casual association during formation.

PRELIMINARY NOTES ON IGNEOUS ROCKS.

Several attempts have been made to classify igneous rocks by this presumed origin, but none have proved satisfactory. They have for example been divided into plutonic, those which have been formed in the depths of the earth's crust; and volcanic, those which have consolidated at the surface. But many once plutonic rocks are now by denudation exposed to view, and the distinction is really one of degree. Again, igneous rocks of the older formations have been regarded as different in character to those of the newer. But the more closely the series is studied the less important and distinctive does this question of age appear. Then structural peculiarities have been relied upon. But these, though valuable in their way, have rather a casual value; for rocks of the same age, and practically of the same composition, under various conditions assume very different aspects. All things considered, the most important features to be noted are, first, the mineral composition of an igneous rock; and, second, the fact of the rock being contemporaneous with or intrusive among the strata with which it is associated. Structural differences have great weight, but it is commonly pathological.

These observations will explain the vagueness of some of the terms current among geologists in dealing with rocks of igneous origin. The words "greenstone" and "trap" are found used interchangeably to cover nearly all the older species, the granites and their allies excepted. There is a certain value in the possession of phrases which may be employed without expressing any definite opinion, but their employment is apt to mislead the uninitiated. Especially is this so when we find, as on the geological map of the district, igneous rocks of the most dissimilar characters coloured and classed as "greenstone."

Our greenstones or traps really belong to six distinct classes:

1. A large body of ancient volcanic rocks—the dunstones—contemporaneous with the rocks among which they are found, therefore of Devonian age. These are the oldest igneous rocks in the Plymouth area, and there seems good reason for associating

them with that singular peak of Brent Tor, which is really the degraded stump of an old-world volcano, and consequently itself partly intrusive, partly contemporary.

2. The intrusive boss of Clicker Tor, originally an olivine-dolerite—that is, a dolerite which, in addition to its normal constituents, contained olivine—now by alteration a serpentine. This is not the only rock of the district, however, in which the change from olivine to serpentine occurs, though it is the only one to which the name picrite, suggested by Mr. J. H. Teall, can be applied.

3. A series of intrusive rocks near the borders of the granite, chiefly identified hitherto in the valley of the Tavy, but ranging over a much wider area. The leading constituents are plagioclase-felspar and diallage, and they are therefore classed as gabbros. Hornblendic forms also occur.

4. A series of deep-seated intrusive rocks, which may be regarded as the “greenstones” proper, so far as that term has any definite meaning, and which for the most part are ancient dolerites; that is, they are rocks in which the leading constituents are or were plagioclase-felspar and augite. These are now in part hornblendic.

5. Some exposures of intrusive rocks which display much alteration. Once dolerites or basalts, they are now, by the development of chlorite, diabases.

6. An intrusive rock on the shore of Cawsand Bay, associated with the remains of the Triassic outlier, undoubtedly of Triassic age, and in all probability the youngest of our igneous series.

We deal with each group in order.

CONTEMPORARY IGNEOUS ROCKS.

Modern volcanic rocks are divided into three great orders—the vitreous, the crystalline, and the fragmentary. Representatives of all three are found among the ancient lavas and ashes of South Devon and their allies. Even the least informed note the resemblance which the highly-vesicular rocks of Brent Tor bear to modern pumice. The pumiceous character of the form of dunstone commonly known as “honeycomb-dun” may not be so readily apparent, but occasionally it is nearly light enough to float upon water.

Apart from the vesicular varieties—and I include under this head both the forms in which the cavities are empty, and those in which they are filled with various minerals, and therefore become amygdaloidal—our Devonian lavas present many difficulties of identification to the naked eye. It is frequently the case that, within a few yards of an unquestionable lava-flow, we find a rock in no way distinguishable from ordinary clay-slate, and between the two such a gradation that it is not possible to say with precision where the igneous rocks end and the sedimentary begin.

This is due to two leading causes. In the first place, the volcanic rocks, being contemporaneous with the rocks among which they are found, have been subjected to precisely the same subsequent external conditions of change. In the second, they consist not only of lavas, but of fragmentary materials—ashes and tuffs, the latter differing from the former in the fact that while the ashes are mainly of aerial deposition, the tuffs have been formed under aqueous influences—the disintegration of the parent material in the one case being mechanical, in the other being caused by the action of water upon molten lava, which sudden cooling has shattered into fragments. Now if no change had taken place in these rocks since they were ejected or deposited, they would be easy of identification, though the tuffs might be confounded with sandstones, as indeed has been the case with certain of their more friable varieties. But there has been at least one very great change, in the development of slaty cleavage by the rearrangement of particles under pressure, and as the ashes and tuffs have in their degree been amenable to this action, they too (and occasionally also the lavas) have acquired the fissile character which is at times so puzzling. But the microscope sets nearly all doubts at rest.

Making allowance for the changes superinduced since the formation of our local volcanic series, these present precisely the same phenomena as lavas and ashes of the present day. True the vitreous character is not, as a rule, distinct, but it is by no means wholly lost. It is seen, for example, clearly in the Brent Tor pumice, and is well marked in a singular slaggy rock at Egg Buckland. This rock has the casual aspect of an amygdaloid, containing rounded white fragments in a dull, compact, semi-glassy base. Microscopic examination, however, indicates that it

was really a vitreous lava, with porphyritic characters. In this case the pseudo-amygdaloids are mainly groups of felspar crystals, some of which are shown by polarized light to be twinned. From the variety no less than the general character of the rocks at this particular exposure, there appears reason to conclude that it was a centre of volcanic activity. Steatite occurs in patches. At Keyham there is a finely-amygdaloidal lava, in which calcite crystals are porphyritically developed.

The ordinary dunstones are greenish or bluish-grey in colour, weathering to a rusty brown, and losing much of their compactness in the process. The harder kinds are often tough, and make excellent road-metal. The vesicular varieties are chiefly among the weathered section, but much of the blue compact rock is amygdaloidal, and the probability seems to be that in the process of weathering the cavities have been emptied, rather than never filled.

Sections have been cut of these amygdaloidal rocks from Landrake, Honicknowle, and the boss at the corner of St. Andrew Churchyard. The vesicles in each are filled with calcite.¹ There is a grey ground-mass traversed by lath-shaped felspar crystals, some distinctly plagioclase. Oxides of iron occur in little dots and patches. Pyrites, in some examples, can be seen with the naked eye, but there is a considerable quantity of magnetite, and a little ilmenite. All these examples show that the rock was originally vitreous, and has undergone considerable change. Little beside the feldspathic characters and iron oxides is visible, as a rule, in the ground-mass. The iron oxides explain the ferruginous change that occurs in the process of weathering—what really takes place being the conversion of anhydrous peroxides into hydrous.

Another form of amygdaloidal rock is that represented by a section from an exposure near Whifferton. It is a dull olivaceous-green, with kernels of pink calcite, and under the microscope shows distinct fluidal structure; the yellow-green ground has a somewhat marbled appearance, in consequence of the occurrence of dark interlacing strings and patches. This is possibly a result of the manner in which the original base of the rock has been changed into chlorite.

¹ Occasionally zeolites occur, and an amygdaloid near Kitley was found to have its cavities largely filled with mealy zeolite.

The general character of the more massive rock is very well seen in a section cut from an exposure to the north of Colebrook, which shows a greenish-grey mass of felted lath-felspars on a ground with a dirty flocculent aspect. There is a good deal of magnetite present. No augite is visible, and it has probably been decomposed.

Our fragmental volcanic rocks present some puzzling peculiarities. At the Devon end of the Royal Albert Bridge there occurs a rock with a schistose-granular and, in part, scaly texture. The microscope shows it to consist of fragments of broken crystals and lava; but there appears to be a strongly-marked fluxion structure in the enclosing network. It is not vitreous, nor does it seem ever to have been so. There is no doubt that it is a tuff; but it differs from my other examples of this class in the extent and nature of the interstitial matter, which suggests to me the active presence of highly-heated water, though no doubt pressure has often simulated fluidal characters.

A still more remarkable tuff was found in the course of the sewerage works at Compton. It has a scaly, granular texture, much as if a number of grains had been interspersed lineally between undulating and impersistent slaty laminae. Under the microscope the slaty matter is seen to be very fine-grained, with a "cobwebby" texture. Such a rock might be formed by the rearrangement under water of granular tufaceous matter and volcanic dust, the slaty aspect being given to the finer particles by the subsequent pressure, which in the compact, even-textured rocks produced slaty cleavage. The scaly parts probably contain a considerable quantity of volcanic-glass. The granules are chiefly felspar and quartz, with a little calcite and iron peroxide.

A simpler tuff occurs at Crabtree, where a crypto-granular rock is seen to enclose distinct patches of slate. This was noted by Mr. Prideaux, who, with singular discrimination, pointed out that these patches were "formations," and not "breccia."

Our best defined tuff is, however, again from Compton, and, oddly enough, is the example selected for slicing, as best adapted to illustrate the most compact form of our lavas. Great was my surprise, on examining this slide, to find that it was wholly made up of small grains, with a very small quantity of interstitial matter. At the other end of this series we have a mere sandy aggregate occurring at Egg Buckland—a tuff which has lost its

coherence, and which probably few would imagine to be a volcanic rock at all. Indeed, the Crabtree tuff is at times very deceptively like sandstone.

The most characteristic ash is perhaps that found at Mount Batten, a soft semi-schistose rock, with ochreous patches. Under the microscope it has a very irregular look, and shows no signs of crystalline structure beyond the presence of some grains of magnetite. It is clearly made up of very fine particles of volcanic matter, and owes much of its appearance to the oxidation of its iron.¹

A very interesting ash also occurs at Radford, and in its colour is no doubt the origin of that name. It is a dark-red, fine-grained, open-textured rock, which has some rather puzzling characteristics. For one thing, it is neither vesicular nor scoriaceous, and its openness appears therefore difficult to account for, unless some of its constituents have been removed. A few fine calcedonic veins are apparent. The blowpipe shows that the colouring matter is iron, and that silica is largely present; and on treating some of the fragments with warm hydrochloric acid, the broken felspar granules, which form the chief constituent, are revealed.

A noteworthy felstone, not improbably an altered lava, occurs in the Saltash Road, near Camel's Head Bridge.

Various names have been given to our local lavas, and there is a good deal of what may be regarded as an intermediate character about them. They have been termed diabases, andesites, and basalts; but probably they range between the two latter, which indeed have points of close relationship. The schistose-tuffs have been associated with the Continental schalstein.

Two of the most interesting rocks connected with our volcanic series are a slate from St. Budeaux and another from Drake's Island. Their interest consists in this, that while they appear true slates in general composition and structure, they contain little patches. These the microscope reveals to be fragments of consolidated lava, which fell into the bed of the sea wherein the silt was being deposited that, in the course of ages, has become clay-slate. The fragments are really volcanic fossils, and their occurrence will

¹ The ash beds not infrequently contain fossils. Encrinital plates occur in the Batten ash; corals, &c., in ash near Dartington; and *Phacops lævis* in ash at Highweek.

help to explain the difficulty of distinguishing the real character of so many of our schistose rocks. Calc-schist occurs at St. Budeaux, and veins of red jasper among the Compton lavas.

Brent Tor.—But we cannot pass over Brent Tor, the presumed parent, in part at least, of the series.

On a casual view Brent Tor appears to be mainly composed of a dark-red vesicular rock, at once identifiable as a pumice, some of the cavities of which are filled with (for the most part) siliceous matter; and of a more compact, ashy-looking rock, of a dark-reddish-grey: but closer investigation shows that there are several other varieties. Mr. Rutley, in his work on “Brent Tor,” describes no fewer than seven sections—pumice-breccia, devitrified-rhyolite, scoriaceous-lava, decomposed basalt-lava, and basalt. These rocks really form a sub-series to themselves, though, as already noted, the ashes, &c., of the vicinity very much resemble, and in some cases are identical in texture with, the schistose ashes and amygdaloidal rocks of our own immediate neighbourhood.

I have examined six sections of the Brent Tor rocks, some of which agree with Mr. Rutley’s descriptions, and others vary. The “pumice-breccia” section contains in the matrix a number of minute doubly-refracting microliths and granules, with calcite here and there. The pumice is seen in vesicular patches. The “rhyolitic-breccia” has a devitrified felsitic magma, which shows fluxion structure, and contains fragments of vesicular rock. Quartz occurs in granules, strings, &c. A finely-vesicular amygdaloid, which may be classed with his “scoriaceous-lava,” has the cavities filled with quartz and calcedony; the matrix is opaque, with abundant microliths. There are a couple of tuffs. One is a warm-yellow-drab, brecciated rock, having veins, composed of granules, with opaque and ferruginous interstitial matter. The granules are chiefly quartz, but some are apparently olivine. Another tuff—a grey, crystalline, compact rock—is apparently all quartz. A fine-grained, dark-purple semi-schistose rock fairly answers the description given by Mr. Rutley of an altered basalt, but contains scoriaceous matter, the bulk of the slide being opaque and semi-vesicular, with microliths developed in the matrix. The whole series form a most interesting study.

INTRUSIVE IGNEOUS ROCKS.

We pass next to the intrusive rocks. They are readily distinguishable as a rule from the lavas by their darker hue—green predominating, and by their markedly crystalline texture. They are the distinctive “greenstones” of the older geologists. They are not of such frequent occurrence as the lavas; they do not graduate into the contiguous rocks, though at times they produce considerable alteration; their own boundaries as a rule are well defined; they are not associated with ashes or tuffs; they contain a greater variety of minerals, and although in several instances much altered, their structure is commonly more distinct. They may be divided locally into five groups.

1. *Picrite*.—The one distinctly peridotite rock of this locality, and the only one therefore which fairly represents in our neighbourhood the olivine group, with which Professor Bonney commences his new rock classification, is the boss of Clicker Tor. This is now commonly regarded as a serpentine, and was originally, according to Mr. Allport, an olivine-dolerite.¹ The olivine is nearly all converted into serpentine, and the process of conversion has taken place in the usual semi-reticulated fashion, which makes a section an exceedingly beautiful microscopic object. The mass of the rock is thus now serpentine, and the olivine chiefly represented by pseudomorphs, but the general structure is thoroughly characteristic. Augite and magnetite are also present.

2. *Gabbro*.—To the north-east of Tavistock, at Cornwood, and elsewhere on the borders of the Moor, we have a set of exposures of a somewhat remarkable group of rocks. The Tavistock division, which are best known, occupy in part what may be called a bay in the granite, ranging north and south, from Brazen Tor to Cocks Tor. They are described by Mr. Rutley in his “Eruptive Rocks of Brent Tor and its Neighbourhood,” as consisting mainly of gabbro, with some amphibolite, and possibly some diabase. The best characterized are hard, tough rocks with a sub-metallic appearance, and some loose, scattered blocks ring almost like a

¹ Mr. J. H. Teall, F.G.S., who figures it in his magnificent work on “British Petrography,” suggests the use of the name “Picrite.”

bell under the hammer. Whatever the variation in composition, they evidently belong to one series.

An exposure of the same class occurs at Lydford, and there is a fine boss at Houndall, in Cornwood. The characters of these are first noted in this paper. The Hennock and Botton rocks, near Bovey, also appear to belong to this group,¹ and there are similar rocks elsewhere on the borders of the granite. The suggestion from the phenomena they present seems to be that they were originally deep-seated dolerites, brought up on the flank of the granite in its upthrust, and subsequently exposed by denudation. They exhibit considerable alteration, and there is a development of hornblende which appears to be connected with the contiguity of the granite. Very much the same phenomena are exhibited in association with the Land's End granitic area.

The more distinctly-charactered gabbros come from Cocks Tor and Houndall. Lydford, Brazen Tor, and White Tor show more alteration in the development of hornblende. We have also hornblende-schists associated.

The pyroxenic mineral in the Cocks Tor rock, which most observers regard as diallage, is indeed by some considered augite, in which case the rock would rather be a diabase. However, there is little reason to question its right to rank among the gabbros. It is a much altered rock, containing green pyroxene, in some cases partly converted into hornblende; and the feldspars are as a rule much decomposed, while the ilmenite is also decayed. Some parts of this rock are much fresher than others. The best local examples of diallage are perhaps to be found in the Houndall boss, in some portions of which this mineral is remarkably well developed. The sections examined contain much ilmenite and iron oxides partially decomposed (hematite and limonite?), some plagioclase lath-feldspars, and needles of apatite.

White Tor yields characteristic examples of the development of hornblende. A section cut from the summit contains both pale brown and green hornblende, diallage, and beautiful skeleton crystals of ilmenite. No feldspar crystals are visible. There are some pale blue dichroic grains, which present the appearance of

¹ So does the intrusive rock of St. Cleer Down, near Liskeard, which has usually been classed as hornblendic, and contains exceptional proportions of that mineral. Its identity as a member of this series is however unquestionable.

tourmaline. A detached block near the base of the Tor bears much the same aspect. The same green and brown hornblende is present, with lath-felspars, patches of ilmenite, and a little augite, as well as diallage. Both these rocks are dark-grey; black when polished. A slide cut from a small nodule of the rock, apparently a contact specimen with the granite of Brazen Tor, is mainly pale-green hornblende with plagioclase-felspar, and opaque grains and crystals, probably ilmenite and magnetite. The Lydford rock much resembles that of White Tor—the green hornblende well marked, a little brown, and porphyritic crystals of orthoclase felspar.

The nearest approach among our local rocks to the diorites is in this group.

Hornblende-Schist.—Rocks which may be classed under this head, though of varying character, occur, chiefly in connection with the gabbro, at Waspworthy, Cocks Tor, Smear Ridge, Peek Hill, Houndall, and Ivybridge. Mr. Rutley describes the amphibolite of Waspworthy as consisting of quartz, pale-brown hornblende, and pyrites. A section cut from a specimen collected at the same spot, and having the same outward appearance, shows, however, in addition a number of lath-crystals of felspar. Probably there is considerable variation in a small range. The Houndall rock in external appearance much resembles this, but the felspars are less prominent, and the pyrites and hornblende are more abundant and more regularly distributed. The lamination in these two rocks is not distinct, as a rule, but in the Ivybridge example it is much clearer. Under the microscope the hornblende, which is in very small patches and flecks, is seen to closely resemble that at Waspworthy, but the quartz foliations are much more pronounced. Contiguous to both the Peek Hill and Ivybridge rocks is a green banded rock, commonly called “ribbon-jasper,” between the schist and the granite, and apparently jaspidized by the action of the granite on the schist. Under the microscope it is seen to consist of quartz and a green dichroic mineral, which partially resolves itself, under higher powers, into delicate green-bladed crystals of actinolite. The rock may be described as consisting of laminations of ordinary quartz and prase = prase-schist. There is some evidence that here we have a result of a double change; first, the conversion by pressure of a dolerite into hornblende-

schist ; secondly, the alteration of the schist by heat into "ribbon-jasper."¹

3. *Dolerite*.—The most characteristic of our dolerites occur in a series of bands on the west of the Tamar, near Saltash, and extending in part across the river to the eastward. The Geological Survey map makes no distinction between them and the lavas of the same locality ; but, save in their igneous origin, the two series are quite dissimilar. Considerable interest attaches to these dolerites, which have been made the subject in part of investigation by Mr. J. A. Phillips. Being largely worked for road metal, they are the source of the highly crystalline fragments of dark heavy rock, so frequently to be found on the highways in the vicinity of Plymouth.

One of the most compact, and microscopically the best preserved, is a crystalline variety from Treluggan—a heavy rock, very dark-green in mass, with dark sparkling crystals. It contains, among other minerals, hornblende, chiefly brown, apatite, augite, viridite, chlorite, and magnetite, in a felspathic base. The groundmass of the Weard rock is felspathic, with largely developed plagioclase, and disseminated through it are brown mica, hornblende, viridite, magnetite, apatite, epidote ; there is a little augite. The Burraton Combe rock is compact and tough, but not so well charactered in the section examined. It contains much altered ilmenite, and numerous needles of apatite. The Notter rock has a good many points of resemblance, with granular augite, a little hornblende, and plagioclase-felspar ; and in fact the differences are not greater than we should expect to find in parts of one eruptive boss.

A peculiarly interesting dolerite occurs at Ernesettle. Stray surface boulders may be seen near King's Tamerton, and while it weathers very brown and rotten, in its compact condition it has a mottled aspect—grey and blackish-green. It was found in situ in digging a well at Ernesettle, in spheroidal masses, and can be traced on the beach below, where its intrusion has altered some slate into a very fine-grained, compact, olive-grey rock, approximating to Lydian-stone.²

¹ Much the same alteration has been produced in the rocks between the St. Cleer boss, already noted, and the Caradon granite ; and it is also seen near Okehampton.

² Occasionally we find these intrusive bands give contact slates quite a flinty consistence.

This Ernesettle rock contains a good deal of brown and strongly dichroic hornblende, occasionally patched by viridite, augite, particles of ilmenite, and a little mica. It also contains plagioclase-felspar. Its closest alliance is apparently with the Weard variety.

4. *Diabase*.—The greenstone of Rock and Estover is really green, and has a very handsome appearance on a polished face, light green mottlings contrasting with the dark. It is chiefly felspathic, and the base contains numerous lath-shaped crystals, some of which are plagioclase, but which generally have undergone considerable alteration. There is also augite, well developed, ilmenite, and pyrites, and a group of greenish minerals resulting from the decomposition of olivine—viridite, chlorite, and in larger quantity serpentine. Professor Bonney suggests the former presence also of enstatite. The rock is now a diabase; it is most altered on its borders.

The large intrusive mass which occurs on the north of the Yealmpton limestone, and to the action of which upon the latter the beautiful green colour of the marble of that locality is probably due¹ (some of the slate has been turned into “porcelain-jasper”), has many points of resemblance to that of Rock and Estover. The felspar crystals are not so pronounced, but plagioclastic characters are more distinct. There is not so much pyrites or ilmenite, but alteration products occur much as in the other, and there are granules of augite with apparently a little olivine. This also is now a diabase. (A rock at Park House, Dartington, belongs to the same group.)

A boss at Yarnham, near Modbury, the broken joints of which have yielded considerable quantities of asbestos, differs from every other rock in the district.² It is dark, hard, fine-grained, and compact. It contains an abundance of magnetite and some pyrites, skeleton felspars, small granules of augite, and bands of yellowish-green epidote. Once a basalt, this too is now a diabase.

Epidote is one of our rarer minerals, and was not recorded as a Devonshire species, except microscopically, until identified in the Yarnham rock. There is a thin band of igneous rock intruded

¹ Some of the limestone on Stonehouse Hill has assumed a green tinge in contiguity to the lava flow there.

² Fragments much resembling it occur on the beach at Seaton mouth.

among the slates near Lydford Gorge, that has become in parts almost wholly converted into this mineral.

5. *Felsite*.—Two sections cut from the Triassic trap of Cawsand do not afford much information. One was taken from a more earthy, and the other from a more vitreous variety, and the latter has a decidedly fluidal aspect. The base is felspathic, the colouring matter iron, and as a rule it has a dirty flocculent look under the microscope. There is a good deal more mica brought to light by the lens than is apparent to the naked eye, some decomposed, and some strongly dichroic. In addition to the mica, felspar is porphyritically developed, and in some cases has changed into felsitic matter; there is a little ilmenite. A group of felspar crystals, altered, in the centre of the earthy section, has enclosures much muddled up with ferrite, and among them is what is apparently a needle of apatite. The rock may be called a felsite, but it appears to have been a basalt. The columnar structure it develops on Cawsand beach is one of the most notable features of our local petrology.

GRANITES AND ELVANS.

Granite.—It is not easy to improve on the general description of the Dartmoor granite, given by Sir Henry de la Beche: "As a whole, a coarse-grained mixture of quartz, felspar, and mica; the latter sometimes white, at others black, the two micas occasionally occurring in the same mass. It is very frequently porphyritic from the presence of large crystals of felspar, and here and there schorlaceous; but the latter character is chiefly confined to the outskirts, where it adjoins the slates."¹ The colour is commonly a bright-grey—or creamy-white—occasionally with a bluish tinge; but it usually weathers to a ferruginous-brown, the tint penetrating some little distance from the surface, to an extent varying with the compactness of the texture of the rock.

The most striking physical feature of granite is the manner in which it is jointed. All who are acquainted with the Dartmoor tors are familiar with the stratified appearance many of them present; the mass is at times separated into tabular portions of considerable size, often into blocks which have the appearance of masonry, while occasionally a columnar arrangement is shown,

¹ *Rep. Corn. Dev. W. Som.* p. 157.

as in the cliff of the Dewerstone. Little wonder, then, that the elder geologists inclined to the belief that granite was really stratified ; or that unscientific observers, gazing upon such a grand example of mural jointing as the the rocky crown of Pew Tor, should assign it an artificial origin.

This jointing, or fissuring, dates back to the time when the granite was cooling and contracting (for I have no doubt whatever that our granite was once in a fluid and highly-heated state) ; but its initial character has been greatly modified and enhanced by atmospheric action. Granite is so hard, and to all appearance so enduring, that its power of resisting the waste of wind and rain and frost, and the disintegrating operation of vegetation, is commonly overestimated. A good deal depends upon the texture. The fine-grained, compact granites have high resistile powers, but the coarser crumble away with comparative ease. To weathering our granite groups owe such characteristic outlines as those of the Cheesewring, or Bowerman's Nose. The basins once attributed to the Druids were chiselled by wind and rain. The huge chaotic carpetings of blocks, which form the "clitters" of the tors, were probably detached by frost. How speedily weathering will progress under favourable conditions, a fact observed by myself in the quarry at Trowlesworthy Tor will indicate. From a joint face, left solid when the quarry was worked at that point, probably about twenty years previous, a peel of granite an inch in thickness, but several feet in superficies, had been so completely detached from the parent mass that the introduction of a stick sufficed to bring down the whole. The fissure thus widened was no doubt quite imperceptible when the quarry was abandoned, but still it was there, and year by year the percolation of the water, and the repeated expansion of frost, widened it to such an extent that my stick could have hastened the end by a very short time only. Lichens and mosses also play an important part in the process of granitic disintegration, but they in return protect the rock from the ordinary weather influences.

The varieties of local granite are very numerous, as the study of the bed of any of our moorland streams will show. Those which have been chiefly worked for commercial purposes, as at Hey Tor and King Tor, are porphyritic, from the appearance of large crystals of felspar. The King Tor granite is a good, compact stone, fairly even in texture, regular in colour, and with ex-

ceptional lasting qualities. The quarries here are the most important in this immediate locality. A grey granite has also been quarried at Shaugh, in which tin ore is occasionally disseminated. Happily, however, the Dewerstone quarries are no longer worked. Much granite has been wrought from the loose blocks on the surface of the Tors, and no little injury done to their picturesqueness in the process. Pew Tor has in this way been somewhat extensively worked. The granite here is a warm-grey porphyritic variety, a good deal of the felspar having a granular aspect. There is black mica and a notable proportion of schorl.

Granite worked at Ivybridge is bluish-grey, compact, and even-textured, with porphyritic feldspars, a little schorl, and black mica. Lustleigh yields an even-grained bluish-grey variety, containing black mica, with porphyritic development of lath-shaped feldspars and quartz. At Stone Tor, near Chagford, there is quarried a compact, close-grained porphyritic granite much resembling this. Associated with the Chagford granite are some dark-grey nodular segregations, which, as Mr. J. A. Phillips has shown, are essentially a fine-grained phase of the rock in which they occur.

Coarse varieties of grey granite are to be found on almost every Tor, especially near the edge of the granitic area. The Staple Tor granite, with large crystals of felspar and an abundance of black mica, affords a very good illustration. Very coarse-textured porphyritic granite also occurs near Princetown. The mica is black, and the felspar much decayed. From the size of the quartz and felspar crystals this may be ranked as "giant-granite." It has, however, interstitial fine-grained granitic patches, which give it a distinctive character, and is thus really granite porphyritically developed in a semi-crystalline granitoid ground mass. Not infrequently the ordinary granite is traversed by veins of much finer grain, which do not seem the result of segregative action, but of subsequent origin, the division lines being distinct, and the intrusive character plain.

The finest-grained granite rock that I am acquainted with on the south-western side of the Moor—and one that may fairly bear comparison with the white granite near Okehampton, of which De la Beche speaks as rivalling statuary marble—occurs near the Devil's Bridge. It is of the most even granular texture, mainly white felspar with delicate needles of schorl, mica as an essential

constituent being absent. It is therefore not typical granite, but semi-granite or "aplite."

The most beautiful red granite of Devon is supplied by Trowlesworthy, and there is no richer red to be found anywhere than its darker varieties. Those examples which contain schorl are the most effective; but the gradations are manifold between the deepest red and the palest pink. The texture is fairly even, feldspar predominating, and mica by no means prominent. Indeed a good deal of the rock may be termed—in its absence—a "schorlaceous-pegmatite." There are veins of a compact, fine-grained red variety; and some in which the schorlaceous portions are segregated from the more felspathic, which would be very ornamental in mass.

Veins of red granite occur also near Shaugh, at Hanger Down, and in the upper valley of the Tavy, among other localities.

Further local varieties of granite that claim special notice are: a pink schorlaceous rock at Leather Tor; a very fine-grained pink vein, with a little black mica and schorl, at Brazen Tor; a similar vein at Eylesburrow; a fine-grained pink porphyritic vein at Ringmoor, nearly approaching to an elvan; a fine-grained dark-grey granite with black mica at Sheepstor.

Though out of our immediate district, a singular form of granite from South Caradon Mine cannot be passed over. It is so far normal that it contains the usual constituents—feldspar, quartz, and a little mica. There are, however, two felspars—one well crystallized and compact, bright red in colour; the other less abundant, white, intimately associated with the quartz, and thoroughly kaolinized. There is likewise a chloritic-granite, and a cupriferous form strongly tinged with green carbonate. Granite with fluor has also occurred in the neighbourhood.

Elvan.—This is a local Cornish name for a variety of felstone—a rock chiefly composed of felsitic matter, and in which either quartz or feldspar is commonly developed porphyritically, and mica not unfrequently occurs. Its ultimate composition is in the main much the same as that of granite, and rocks of all stages of intermediation may be found between the two. Most of our elvans, from the development of quartz, are also classed as quartz-porphyry. Felsitic matter has been defined by Mr. Rutley as an "intimate granular-crystalline, micro-crystalline, or crypto-

crystalline, admixture of orthoclase and quartz, in which crystalline granules of plagioclastic feldspars not unfrequently occur." This definition covers a wide range of characters, and when the porphyritic constituents are taken into account also, we find the term elvan to have a very broad and vague application. All dykes of granitoid matter, not distinctly granitic, pass indeed under this name. By the aid of polarized light, however, the microscope reveals a characteristic structure of the true elvan—a brightly-coloured minute mosaic, due to the intimate mixture of the crystals and granules of the quartz and feldspar in the matrix.

Apart from those directly associated with the granite, we have five elvan courses within a few miles to the north of Plymouth. The nearest and best adapted for study stretches from Cann Quarry, by Colwell, to near Knackersknowle. At Colwell it is worked for road metal, and about thirty feet wide, striking five degrees south of west, with a dip of sixty-five degrees south. Another elvan dyke, taking the same general direction—as all the elvans of this district do—runs from Bickleigh Vale towards Fancy; and there is yet another close to Jump. But the finest example in the neighbourhood is that which traverses Roborough Down, stretching for three miles from the Tavy at Lophill to within half a mile of the Meavy. This elvan is quite historic, and was largely used in building operations in this district in the Middle Ages, being a free-working material of great durability. Roborough Rock is the projecting portion of another elvan, which differs mainly from its companions in its more quartzose aspect.

Microscopically these rocks all present the mosaic characteristic of felsitic matter under polarized light. The base of the Roborough elvan is a very fine granular mosaic, scattered through which are a number of pyramidal limpid quartz crystals, and hollows whence similar crystals have disappeared, occasionally lined with a yellow-greenish crust. The Colwell elvan is very similar, but quartz crystals seldom occur. There are a few flecks of mica, and some dendritic markings. There are casual traces, apparently, of schorl. In Cann Quarry this elvan is rather more irregular in character. There is more mica, more quartz, and feldspar is also porphyritically developed; on some of the joint faces there are brilliant prisms of rock-crystal, with cubes and other forms of pyrites.

The Jump elvan is microscopically of finer grain than either of the others. Roborough Rock has a more characteristic elvany

look under the microscope than in mass. The mosaic shows two customary sizes of grains, with plenty of small interstitial patches. The felsitic matter might almost be regarded as developed microporphyritically.

A number of elvans occur in the Plym Valley, specimens of which may be found among the pebbles in the bed of that river. A very even-textured, cherty-looking, pink variety contains little nests of schorl, and weathers to a warm pinkish-buff. Apparently allied to this is one in which the schorl is dispersed so generally and so finely through the felsitic matrix as to give it a finely granular appearance. Here and there distinct crystals of felspar are developed; while in a further example both quartz and felspar are porphyritic, some of the crystals being of considerable size. The base continues distinctly felsitic. There is a rock of much the same character near Cornwood, mainly a dull, deep-pink, massive glassy felstone, with semi-conchoidal fracture.

Another Plym Valley elvan is pale-buff, distinctly granular, with an occasional fleck of white mica, and a quartz crystal, or a cavity from which the crystal has disappeared. A very similar rock from Shaugh, in the number of its quartz crystals and cavities closely resembles the Roborough elvan, but has occasional needles of schorl. A fine-textured, whitish quartz-porphyry—both quartz granules and crystals and felspar crystals being developed in a close felsitic matrix, slightly speckled by schorl—occurs near Trowlesworthy. Not far distant is an elvan with black mica and schorl in a granular base.

A further variety from Shaugh, dirty whitish-brown in colour, is almost wholly composed of quartz and felspar distinctly crystallized, the felsitic matrix being reduced to a minimum. As other examples show, the distance is not very great between this and true granite, mica and schorl occasionally making their appearance, and the whole rock being essentially crystalline.

A rock of this class forms the junction at Shaugh, at one point, between the true granite and the schist. Essentially a quartz-porphyry, it contains a vein which is a fine-grained granite, and into which the mica appears to have segregated.

A variety of the same class, from Cadover, tolerably even-textured and semi-granular, contains schorl in little strings, irregularly dispersed; and this again has a neighbour that is really a fine-grained schorlaceous-granite.

A close-textured, vitreous, blue-grey, elvany rock at Lee Moor contains porphyritic quartz.

An elvan at Grenofen is a very handsome rock, but unfortunately does not polish well. The base is of a fine-grained granitoid character, largely composed of quartz and mica, and it contains porphyritic feldspars, pink, brown, and white. The presence of chlorite gives some portions a green cast, and it also in parts reveals pyrites. Mr. Rutley states that it contains hornblende, which would make it a syenitic-elvan. He regards it as a fine-grained porphyritic granite, with a little felsitic material; but adds that it may also be regarded as a quartz-porphry. It serves very well to illustrate the difficulty there often is in classifying our local granitoid rocks apart from their behaviour in the field, on one hand, or their microscopic structure, on the other. As we have seen, the schorlaceous-elvans especially pass with ease into schorlaceous-granite.

Peek Hill yields a granular elvan, with patches of schorl.

A dyke near Modbury, classed by De la Beche as an elvan, is mainly quartzose, hard and crystalline.

Schorlaceous Rock.—We pass to a class of rocks that, while generally granitoid in character, deviate more or less from the granitic or elvanic type.

Schorlaceous-granite, already mentioned, is simply granite which, in addition to the ordinary constituents, contains varying quantities of tourmaline or schorl, occasionally amorphous, or granular, but usually crystallized, not unfrequently in long, radiating, hexagonal needles. This granite, as Sir Henry de la Beche says, is commonly met with on the borders of the Moor, and may often be traced passing into schorl-rock, by the disappearance first of the mica and then of the feldspar. Examples are to be found, however, of distinct junctions between schorlaceous-granite and schorl-rock, in such a way as to indicate that the latter is the product of a distinct antecedent. The same point may be observed in the junction, clear and distinct, of ordinary schorl-rock and schorl-schist—which is made up of foliations of schorl and quartz—showing that the two have not one common origin, though their present condition may probably be due to the same agent and period of alteration. This fact does not seem to have come under the notice of De la Beche; but it is one of considerable importance, and indicates the

secondary origin of the schorl as a constituent of these rocks generally. We note this also in the occurrence of schorl-pseudomorphs after felspar.

Schorl-rock, or "schorlite," is properly a mixture of schorl and quartz, commonly found in nearly equal proportions. It has several forms of textural constitution, and at times is composed of fragments of massive schorl and quartz of considerable size, presenting a prominent black-brown and white variegation. It occurs in all gradations of structure between this coarse, irregular mixture, and a very fine-grained, highly-crystalline, dark-grey rock—as near Shaugh—which might be used for ornamental purposes with very good effect. Curious associations of schorl and quartz are likewise found segregated in the midst of the granite. A schorlaceous rock near Meavy display the proof of alteration in the existence of quartz-pseudomorphs after felspars. There are also some very curious brecciated schorl-rocks in the same locality; and at Wigford, one with porphyritic quartz blebs and crystals.

Luxulyanite.—The association of tourmaline with felspar under certain conditions produces a rock which is known, from the parish of Luxulyan, where it was first observed, as Luxulyanite. This is the rock of which the Duke of Wellington's sarcophagus is made—a mixture of black or very dark greenish-black tourmaline with pink felspar. Though first to all appearance noted here by myself, Luxulyanite is by no means of infrequent occurrence on Dartmoor. The normal form occurs at Leather Tor, also at Trowlesworthy; and I have found typical examples brought down by the Tavy as far as Denham Bridge. A very striking example is supplied by Lee Moor, in which the felspar is pure white. Near Chagford there is a fine-grained Luxulyanite plus a little mica, associated with a granite in which the mica has been replaced by schorl. I have also found this rock, with white felspars, near the Cheesewring.

A rock closely allied to Luxulyanite occurs on Saddleback and near Shell Top—massive schorl with felspar crystals porphyritically developed; sometimes small and irregular, sometimes of considerable size, and well formed. The schorl in what I regard as the leading variety forms a matrix. Quartz occasionally occurs. The felspar is at times pink, at others white, and sometimes has a yellow cast.

Greisen and Pegmatite.—Greisen, which is a mixture of quartz and mica, occurs at Saddleback and near Cornwood, and probably is not infrequent along the border line; and pegmatite—quartz and felspar, in large crystals—is found below Trowlesworthy, and carried by the river as far as Plym Bridge, some examples with red felspar being very characteristic. Occasionally this rock is seen in veins traversing the slate. An even-textured granular pegmatite occurs at Chagford, and a very handsome form in the bed of the Erme, below Ivybridge, with a schorlaceous variation near the granite. Fine-grained pegmatite (aplite) is found at Brazen Tor, and some has been washed for many miles down the Tavy.

Trowlesworthite.—The most remarkable rock of this locality is that which I discovered on Trowlesworthy Tor, and named from its habitat Trowlesworthite. It is mainly a compound of felspar, tourmaline, and fluor, with a little quartz in occasional grains. The habits of the tourmaline in this rock and in Luxulyanite are exactly similar. Professor Bonney, who kindly examined it, has come to the conclusion that it is an altered rock formed from the normal granite of the district—the mica having been replaced by brownish tourmaline, some portions of the felspar by greenish-black tourmaline and quartz, and the original quartz by fluor-spar. There is a fluoriferous granite with which some petrologists have hastily confounded this Trowlesworthite; but up to the present moment it remains true that this rock has only been found in this one place, in only one block; and that all the specimens known have therefore passed through my hands.

Kaolin-Rock.—As a form of granitoid rock, and one of the most commercially important, we should note here the china-clay deposits of Lee Moor, and other localities, in which the felspar of the original rock has been changed into kaolin by a process very imperfectly understood. This must of course be regarded as an altered rock; but it is not altered in the same sense as the metamorphosed rocks to which we shall shortly have to allude. In some instances this change takes a somewhat different turn, and for kaolin we have the indurated variety, lithomarge, which I have found at Peek Hill. The quartz is also occasionally replaced by opal.

China-stone is not found in our district, but there is a decided

approach to it in a rock of the Plym Valley, which contains crystals of gilbertite, the micaceous constituent of the St. Stephens rock.

St. Budeaux.—There is a boss of felspathic rock near St. Budeaux wholly unlike any other in the district, which falls into place best here. It occupies a very small area on the crest of the hill immediately west of Kings Tamerton, on the road leading from Saltash Bridge to St. Budeaux. It is a massive felspathic rock, with well-developed twinned orthoclase crystals, traversed by numerous needles of schorl. These are long slender prisms, and much decayed, so that under the microscope they appear to be largely resolved into a dark-green decomposition product. The existence of this rock was noted by Mr. Prideaux; and so far as I am aware, it stands alone in the immediate locality. It seems to indicate the near neighbourhood of true granitoid, if not absolutely granitic masses.

METAMORPHIC ROCKS.

All rocks are more or less changed, but the term metamorphic is by common consent applied to those in which the original characters have ceased to be prominent, or disappeared altogether. Two great classes of altered rocks are recognized—those which have been changed by causes affecting large areas—regional-metamorphism; and those which have been changed by a directly acting cause—contact-metamorphism. Representatives of both classes occur in the Plymouth district—the one in the gneisses and allied rocks of the Channel area; and the other specially in the belt of rocks girdling the granite. It is convenient to treat these altered rocks as a distinct class, but the practice is hardly scientifically defensible.

Gneiss.—We commence our review of this section with the Eddystone Reef, which is mainly formed of the foliated rock called gneiss.

This gneiss has been familiar to geologists for many years. It is thoroughly typical in its character, and the most recent research has shown that it is one of the very oldest rocks in the kingdom, belonging to the most ancient of all recognized formations—the Archæan. Nor is this all. A very remarkable series of investigations, carried on by Mr. A. Roope Hunt, F.L.S., F.G.S., of Torquay,

have shown that the peculiarities of the Channel geology are by no means confined to this point, but that the bed of the Channel immediately off our coast contains a series of rocks which are quite as distinct from those of the mainland as those of the Eddystone, and have no relations on shore of even approximate resemblance. These Channel rocks vary from those of the shore chiefly in their Archæan character, and appear to indicate that the Channel occupies the site of one of the most ancient land areas on the globe. Of this the Eddystone Reef is believed to be a fragment, and Professor Bonney also regards the metamorphic series of the Bolt Head as another remnant. The age of the Bolt rocks has been one of the most notable problems of our local geology, and they have been recently regarded as Devonian in their origin, and metamorphosed by the presence of granitoid rocks hidden beneath the waters of the Channel. But as the metamorphism here is regional and not contact, which cannot be traced far from the vicinity of a directly-acting cause, the probability seems to be in favour of Mr. Bonney's hypothesis.

Now the gneiss of the Eddystone Reef, while associated with rocks of allied composition which have a more granitic aspect, is, as I have said, thoroughly typical and well charactered. There are also a few specimens of gneiss in existence, which are believed to have come from the Shovel Reef in the Sound, and to have been taken therefrom when the Breakwater Fort was built. The evidence has been questioned; but that the rock is gneiss, and that it belongs to this locality and was submarine, there can be no doubt.

These gneisses are much alike. They are well foliated and contain garnets; and in addition to the usual constituents of quartz, felspar, and mica, we also have titanite, and probably zircon. The existence of the last two minerals here is known only through the microscope.

True gneiss is not found elsewhere in this vicinity, though there is rock of gneissic aspect in the Bolt series; and gneissic rock occurs in Devon bordering the granite, and in Cornwall at Treluswell, and elsewhere. I have noted micro-gneissic structure in a contact rock from Ivybridge; and some of the mica-schists of Meavy become gneissic by the development of felspar. Some of these rocks in fact may fairly be termed "cornubianite"—a compact, granular, scaly variety of gneiss, met

with occasionally at the junction of granites and slates. These latter forms of gneissic structure are, however, the casual results of contact-metamorphism.

Contact-Alteration.—We pass to our examples of contact-metamorphism—the changes that have taken place in the normal condition of the rocks along the edge of the Dartmoor granite, as a consequence of its intrusion. Rocks, as a whole, may be regarded as in a state of unstable equilibrium. They are not only always susceptible of, but always undergoing, change, as the result of mechanical or chemical agencies. The zone of slates and grits, &c., immediately skirting Dartmoor has been greatly influenced by the upthrust of the granite, and what is more, a reactionary influence has been produced upon that rock. The special presence of schorl in the outer area of our granitic masses, already noted, is, for example, due to a change that has taken place in the original character of the granite; and schorl rock in its different varieties is an altered form. How far we are to connect the occurrence of this mineral with the original granitic upthrust is another matter. The fact that in many cases it evidently replaces the primary minerals that crystallised out of the granitic magma, countenances the theory that it is of later date, and possibly due to the passage upward of chemical vapours, such as are sometimes presumed to have changed the felspar into kaolin.

The change in the granite to which I specially refer, is, however, contemporary with its formation, and illustrated by actual contact junction specimens. The best example that I have seen of a contact hand-specimen from Lee Moor shows the granite in a semi-decayed state, the felspar with an earthy texture. Tourmaline has been developed along the immediate line of junction, and the original slate has been converted into a well-marked mica-schist. In no instance have I found so much reciprocal alteration, with such a clear preservation of the distinguishing crystalline-granular and schistose characters.

A contact specimen from Ivybridge shows precisely the same change in the granitic constituents, the most marked being the earthy aspect of the felspar. The slates are changed into a grey micaceous rock, in which the original structure is to a great extent obliterated. Schorl has developed in the granite.

The granite immediately adjacent to the junction at Lee Moor is in part very compact and highly crystalline, of moderate grain, and suggests consolidation under great pressure, with tolerable rapidity, from a magma in which the elementary constituents were well blended. At other points felspar and mica are the only prominent features of the junction granite; and again some of the contact rocks are almost wholly composed of a felted mass of small brilliant prisms of schorl, with here and there a partially-kaolinized crystal of felspar. If this rock was originally a slate, it has undergone the most marked change of any with which we have to deal in this connection. One Lee Moor contact granite is fine-grained, compact, largely quartzose, with schorl and a little mica. The distance between this and schorl-rock proper would be very small.

An example of granite next mica-schist at Shaugh is very coarse-textured, chiefly composed of felspar in large crystals, with the mica and quartz finely segregated in nests between. Ivybridge supplies a distinct red contact granite, next slate converted into micaceous-schist. At Brazen Tor there is a fine-grained granite next the junction with amphibolite, but the granite of the tor itself is very coarse and porphyritic. The development of hornblende in the igneous rocks of this locality and elsewhere by the action of the granite has been already considered.

The changes produced in the surrounding rocks by the granite are indeed very interesting. The alteration in the adjacent belt of slates, as a rule, proceeds so systematically that it would be quite possible with a little trouble to locate, within a very few yards, the position of a stray specimen from any given area. There are, however, differences in the changes in different localities, apparently due to two causes—first, the original character of the rock altered; secondly, the relation borne to it by the granite in bulk and position.

Now the great change produced in the slates along the southern border of our granitic region is their conversion into spotted slates or schists by the development of nodules or crystals, more or less imperfect, of andalusite, or its variety chiastolite. The words in which the late Mr. Clifton Ward describes the altered slates of Skiddaw apply very closely to those of South Devon. He says: "On approaching the altered area the slate first becomes faintly

spotty, the spots being of an oblong or oval form, and a few crystals of chialtolite appear. Then these crystals become more numerous, so as to entitle the rock to the name of chialtolite-slate. This passes into a harder, more thickly-bedded, foliated, or massive rock—spotted- (or andalusite-) schist; and this again into mica-schist, of a generally grey or brown colour, and occurring immediately around the granite.”

Ivybridge is the only place in this neighbourhood where chialtolite-slate is well developed; and there it fully answers Mr. Ward's description, the colour being bluish-black, and the slender brownish-white—they are hardly the pale yellowish-white of Skiddaw—crystals of chialtolite sometimes more than half an inch in length. Microscopic examination shows very clearly the peculiar structure whence this mineral derives its name—transverse “cross” markings, due to the presence of foreign matter in a granular form. This is rarely visible locally to the naked eye.

The gradual alteration in the normal condition of the slates as they approach the granite, is best seen in the vicinity of Shaugh and Meavy. The first step is the development of a slightly unctuous or of a silky character, passing on, in the one case, into talcose-slate, or, in the other, into the spotted andalusite-slate already noticed.

The silky schist is best noted at Shaugh. It has a very fine, fibrous, glossy, texture, with a sericitic aspect. The microscope reveals the existence of bladed crystals in beautiful radiating groups, and of little colourless microliths.

The spotted or andalusite-slates form the great bulk of the altered rocks. The andalusite is commonly nodular, and its approach to crystalline forms is very imperfect; though crystalline structure is apparent in many instances on careful examination, especially with the microscope. Andalusite is best developed near Cornwood, where the particles are larger, and more thickly scattered through the rock, than elsewhere. Here also the largest crystals of chialtolite in the neighbourhood are to be found, though there is no such distinct occurrence of chialtolite-rock as at Ivybridge.

The passage from the andalusite-slates into the mica-schist next the granite is apparently made by the development of mica in the andalusite nodules. The rock gradually becomes spotted with glittering mica instead of with the dull andalusite, and these spots increase and spread until they form layers, and we have a

micaceous-schist of thoroughly distinctive character, fine or coarse as the case may be. Occasionally the process is carried still further to the production, as already noted, of patches of pseudogneiss, with the foliations of the mica, felspar, and quartz fairly marked. It may be taken as a general rule that the appearance of mica in these slates is a proof of contiguity to the granite, and that the quantity of mica increases steadily up to the point of junction.

There is considerably more variety in the character of the actual altered contact rocks, however, than might be imagined. We meet at times with small veins of granite passing into and through the adjacent slates without effecting any noteworthy change, the body of the injected material being apparently too small for that result. There seems indeed in these cases to be more generally a reaction upon the granitic matter, shown in the coarseness of its crystallization. I have also observed that in many veins mica is almost or wholly absent. Veins in some cases traverse the tourmaline-schist.

As a rule a very distinct change is effected where the granite in bulk comes into contact with the rocks through which it was thrust, and this commonly shows itself not only in the coarseness of structure of the granite, but in an exceptional development of feldspathic constituents. This too is very well seen at Shaugh.

Some of the altered rock touching the granite is exceedingly compact, and has lost all trace, or all distinctive trace, of the fissile structure which it originally possessed. Whether this obliteration is due mainly to pressure is doubtful; but there is one contact rock of a very remarkable character, which undoubtedly has been in a fused or semifused condition, and in which the marks of secondary foliation are not wholly removed. It is now a pinkish felstone, with micro-porphyrific quartz, and grains and radiating prisms of tourmaline, answering to the rock which has received from the continental petrologists the name of hornfels. I have only found it in association with the granite at Shaugh.

One of the most interesting examples of altered slate is found at Meavy, on Ringmoor. It has a talcose aspect, and the andalusite is developed in little lenticular spots of a pale bluish-green, as admirably shown in a section across the laminae. This seems to occur at a considerable distance, relatively speaking, from the granite. The spots of andalusite are very regular in

outline, though they do not manifest any approach to crystallization. Much the same talcose appearance as the body of this rock displays is seen in the killas of Hingston Down when subjected to great heat for the purpose of vitrification, while that process is incomplete. Specks of mica occur in the rock so treated, and there are observable what may be the beginnings of nodular accretions, while when the process is finished it is attended by the distinct if imperfect development of quartz and felspar crystals.

At Meavy too occur spotted slates, with a red cast, containing an appreciable amount of iron (there are thick ferruginous red slates or flags on the granite border also at Lee Moor), and in another phase of alteration the rock is patched with irregular nodular accretions, and strings of micaceous matter, a middle stage apparently between the andalusite-slate and the well-defined mica-schist.

Besides the "ribbon-jasper" of Ivybridge and Peek Hill, already noted as an altered rock, there should be recorded the existence within our area of "porcelain-jasper." This is not true jasper, but baked and highly-indurated clay-slate, and is found at the junction of some of the intrusive igneous rocks. It is plentiful in the vicinity of Lydford. It derives its name from its usual fine-grained, close-textured, porcellaneous look. The Lydford variety is, as a rule, pale-green or bluish, and commonly banded, but different in character from the "ribbon-jasper." I have found a red porcelain-jasper also on the flank of the eruptive boss at Yealmpton, with some portions of the original clay-slate attached, thoroughly melted and scorified.

SUMMARY.

The number of distinct species of rocks occurring in the Plymouth district, as defined in this paper and enumerated here, is upwards of forty, while the varieties would make a very much larger total. From this it will be seen how well founded is the claim put forward for this locality, as possessing an exceptional petrological interest.

The number of minerals, distinctly identified as entering into the constitution of these rocks, several of which have only been recognised by the microscope, approaches fifty, including: achroite, actinolite, asbestos, andalusite, apatite, arragonite, augite,

axinite, biotite, calcedony, calcite, chiasolite, chlorite, diallage, dolomite, enstatite, epidote, felspar (orthoclase and plagioclase), fluor, garnet, gilbertite, hematite, hornblende, ilmenite, indicolite, jasper, kaolin, lithomarge, limonite, magnetite, manganese, muscovite, olivine, opal, prase, pyrites, quartz, serpentine, sericite, schorl (tourmaline), steatite, sphene, zeolite, zircon.

In order to explain the structure of the rocks of the locality more clearly than by mere description, I have prepared a plate containing sketches of characteristic sections of twenty-four of the most typical varieties. In several cases the structure comes out clearly only under the polariscope, and from the absence of colour and the necessary smallness of the drawings, it is impossible to be absolutely precise in all points of detail. Still the sketches, which have been drawn direct from the actual slides, very fairly illustrate their general features, and will probably be found of service in elucidating this paper. A description of each section follows under its appropriate letter. With two or three exceptions a one-inch power was used.

A. *Lava*, near Colebrook.—Greenish-grey, fine-grained rock, soft, with ochreous spots, and cavities with ochreous lining. Microscopically it shows a greenish grey-brown partially felted mass of lath-shaped felspar crystals (plagioclase), with crystals of magnetite and pyrites. The ground has a dirty flocculent look.

B. *Amygdaloidal-Lava*, St. Andrew Churchyard.—Light-grey compact rock at junction with slate. The matrix is much like the Colebrook rock, but finer-grained. Vesicles filled with calcite. These characters are generally those of our amygdaloidal rocks, the originally vitreous character of which is more or less apparent. The Honicknowle variety, in addition to pyrites and magnetite, contains ilmenite.

C. *Amygdaloid*, Whifferton.—Matrix olivaceous-green, with kernels of pink calcite. Chloritic ground between kernels broken by dark strings and patches, giving a flowing texture, and containing partially nucleated subvesicles. Much-altered lava.

D. *Felstone*, near Camel's Head Bridge, Saltash Road.—Warm-ochreous-drab in colour, soft, with banded and veined aspect. Under the microscope it shows a grey-speckled, granular-glassy, patched texture. Probably an ash much altered.

E. *Scoriaceous-Lava*, Egg Buckland.—Hard, slaggy rock, somewhat approximating in substance to a pitchstone. Under the microscope the matrix is seen to contain lath-felspars. The crystals shown in sketch are porphyritic orthoclase-felspars. There is a little iron oxide in these crystals, but more in the matrix, especially round their edges. There are also vesicles, some of which contain calcite, others plagioclase. In another example of the same series there are vesicles with a lining of plagioclase and a central filling of calcite.

F. *Tuff*, Saltash Bridge, Devon end.—Ochreous-drab, soft, schistose-granular, with spotty look and scaly texture. This is a very interesting rock, which might perhaps be called a lava-breccia. It consists of broken felspars, fragments of volcanic rock, and other clastic material, in an apparently fluidal matrix, partially vesicular.

G. *Tuff*, Compton.—This rock has a curious granular-schistose character; the schistose intervals appearing like impersistent slaty laminae. The grains are chiefly felspar and quartz, with a little calcite. The interstitial matter was probably volcanic dust, which has consolidated under pressure, though some of the patches have what appear to be minute vesicles, while others show microliths. Some ferrite is present.

H. *Lapilli* in slate, Drake's Island.—A greenish slate containing fragments of volcanic rock, one of the most characteristic of which, with lath-felspars and crystals of magnetite or pyrites, is shown.

I. *Picrite*, Clicker Tor.—This is the rock commonly known as Menheniot serpentine. Originally an olivine-dolerite. The olivine has chiefly been converted into pale green serpentine, and the main feature of the section is a crystal which has undergone this change. Augite, and magnetite, and pseudomorphs after felspar are also present.

K. *Dolerite*, Ernesettle.—A grey crystalline rock, with flesh-coloured crystals of felspar, and dark crystals of pyroxene. The microscope shows augite, hornblende, viridite, plagioclase-felspar, magnetite, ilmenite, and apatite. There has evidently been much alteration. Weard, Notter, and Treluggan are of the same class.

L. *Diabase*, Rock.—Dark-green, coarsely crystalline, with handsome mottled appearance on polished face. Exhibits ophitic structure under the microscope, and consists of plagioclase-felspar, augite, ilmenite, serpentine, chlorite, viridite. The three latter are the products of the alteration of a magnesio-iron silicate, probably both olivine and enstatite, a few grains of the original mineral remaining unchanged.

M. *Diabase*, Yarnham.—A dark, hard, fine-grained, compact rock, containing felspar, much decomposed, probably plagioclase, grains of augite and iron oxide, viridite, and veins of epidote, one of which is shown, traversing the slide.

N. *Vesicular-Lava*, Brent Tor.—A brownish-purple rock, with vesicles, partly open, partly filled with quartz and calcedony. The matrix is opaque, broken by a number of clear microliths.

O. *Gabbro*, White Tor.—A heavy, crystalline, dark-grey rock, black when polished. Diallage is predominant among the crystalline portions of the rock; but there is also some hornblende, a few grains of tourmaline, and some beautiful skeleton crystals of ilmenite, one of which is figured.

P. *Prase-Schist* (ribbon-jasper), Peek Hill.—A compact quartzose rock, with flesh-coloured and green laminations. Under the microscope the mass of the rock is seen to be dark-green, partially mottled; on the edges this green matter forms delicate bladed crystals of actinolite. This is probably the result of the alteration by the granite of an adjacent hornblende-schist, as at Ivybridge, described under the next head.

Q. *Hornblende-Schist*, Ivybridge.—Dark grey, fine-grained, with light veins or laminations. The microscope shows that it consists of quartz foliations, and of bands which contain numerous flecks of pale-brown hornblende, mostly minute. Between this rock and the granite, as at Peek Hill and elsewhere, is a mass of "ribbon-jasper."

R. *Altered-Slate*, Shaugh.—This shows some of the early stages of alteration produced by the granite. Macroscopically it has a very silky sericitic texture. The microscope reveals the existence of groups of bladed crystals of andalusite, and of a large number of clear microliths.

S. *Chiastolite-Slate*, Ivybridge.—The sections of chiastolite are seen clearly to show the “cross markings” whence they take their name. The light patches are probably imperfect crystals.

T. *Junction-Rock*, Cornwood.—This section shows the actual junction between a fine-grained, light pinkish-grey granite, and a micaceous-schist. The mineral developed in the centre, along the line of junction, is mica. On one side we have granular felspar, quartz, and mica; on the other (the lighter) felspar and quartz, with apparently minute garnets.

U. *Schorlite*, Shaugh.—Fine-grained, dark-grey mixture of schorl and quartz, with cavities containing needles of achroite and epidote. The microscope shows the schorl to be chiefly prismatic-granular, blue and yellow, and the quartz, the light portion of the slide, to contain enclosures.

V. *Elvan*, Colwell.—A couple of porphyritic blebs, rather than crystals, of quartz are shown in the midst of the granular felsitic matter, with a little ferrite or manganese.

W. *Basalt* (?), Cawsand.—Red, dull, semi-vitreous rock, with porphyritic feldspars, partly changed into felsitic matter. Crystals of mica, as in lower right of slide, well developed. General base feldspathic, coloured by iron oxide.

X. *Gneiss*, Eddystone.—This rock contains quartz, orthoclase and plagioclase feldspars, two micas, garnet, titanite, and, according to Mr. Tawney, zircon. The section shows foliation with mica in the centre, quartz on each side, and at top and bottom felspar, in the upper part associated with mica.

Y. *Quartzite*, Newton Ferrers.—A purplish-grey, hard, crystalline rock. There is a little ferrite between the quartz granules, which interlock, and cannot be clearly represented in the microscope without the aid of polarized light.

THE SCOPE OF AMATEUR PHOTOGRAPHY.

SYLLABUS OF PAPER BY W. GAGE TWEEDY, B.A.

(Read 29th October, 1885.)

How restricted a dozen years ago. How extensive now. The cause of its extension. The gelatine dry-plate: its preparation and manipulation. The negative and its uses. Photographic and mechanical printing. What an amateur may do with the camera as an aid to study: its application to architecture, archæology, and other "ologies," art-studies, landscape and the figure, portraiture and perspective. The optical lantern and the microscope. What an amateur had better not attempt. What photography owes to amateurs. Their inventions and discoveries. What remains to be done.

MARINE BIOLOGICAL LABORATORIES.

SYLLABUS OF LECTURE BY J. BROOKING ROWE, F.S.A., F.L.S.

(Read 5th November, 1885.)

INTRODUCTION. Dr. Dohrn and his efforts. The Naples station: its objects and work. Other European stations. The United States Fish and Fishery Commission. American Zoological stations. Scotch laboratories. What it is intended to do at Plymouth.

THE EXPANSION OF THE ENGLISH RACE.

SYLLABUS OF LECTURE BY SILVANUS TREVAIL.

(Read 12th November, 1885.)

ENGLAND in the eighteenth century. The Empire. The old Colonial system. Effect of the New World upon the Old. Phases of expansion. Schism in Greater Britain. The Indian Empire. South African Empire. Australasian Empire. Internal and external dangers. Federation. Recapitulation.

SCHOOL BOARD WORK IN PLYMOUTH.

SYLLABUS OF PAPER BY H. PENROSE PRANCE.

(Read 19th November, 1885.)

EDUCATION gained by the Board itself. Phases of life. Causes of irregular school attendance. Gratuitous education. Is the fee a burden? Remission of fees in Plymouth. Opinions of leading men. Higher class elementary school. Truant school. A day industrial school for girls. Report on our Board Schools for 1884. An "excellent" school. Cookery school. Drill. Singing. Needlework. English. New buildings. Some further necessary improvements.

THE FISHING INDUSTRY OF THE WEST OF ENGLAND.

ABSTRACT OF LECTURE BY BENJAMIN RIDGE.

(Read 26th November, 1885.)

AFTER noting the high antiquity of the fishing industry of the West of England, and its great importance in connection with early and mediæval Plymouth, the lecturer proceeded :

It seems pretty clear that the means principally known and used in very early times for catching fish was by the Seine Net and a sort of Draw Net. Now, however, many methods are used, and almost every practical means known in England are employed by Western fishermen, except it be the Stow Net, used for sprat-catching, more especially off the Sussex coast.

The principal methods are by the Trawl, Seine, Drift Net, Hook and Line (both hand and long line), Moored Nets and Traps, Set Nets, Trammels, Lobster and Crab Pots.

The Seine Net historically is no doubt the most important of the series, and even to-day holds its own, though only used during certain times of the year, for mackerel, pilchards, and sprats. There is special legislative provision for pilchard-seining in St. Ives Bay. The seine is of very ingenious construction, and requires very expert handling to be successful in securing a good haul. The "school" have to be surrounded in order to secure them ; and such enormous quantities of pilchards have frequently been enslaved by the seine, that they have bolted, and carried away the net, finally bursting it and making good their escape. No less than 5,000 hogsheds have been taken at one haul, equivalent to 15,000,000 fish, or a weight, when cured and fit for exportation, of 1,000 tons. Pilchard and Mackerel Seines are each 200 fathoms in length, and 14 fathoms deep ; but are not so

deep at the poles or end, the first being 11 fathoms and the second 8. The seine is contracted to form a bunt or bag, to tuck the net, so as to get the fish in a smaller space. A seine net and boats complete cost about £400; and in 1827 it was calculated that the capital directly invested in the pilchard fishery was £441,215. In that year there were in Cornwall 186 seines employed, and 130 not employed; and the total number of persons engaged in the fishery was 10,521, of whom 6,350 were employed on shore, and 1,600 in 368 drift-boats. In the present year (1886) there are at St. Ives 276 seines, and in Mount's Bay 30; but, by agreement between the owners, only an eighth part are fishing. In 1796 65,000 hogsheads of pilchards were taken; while between 1815 and 1877 no less than 1,027,415 hogsheads were cured and exported, the price averaging £3 per hogshead, or a total of £3,082,345. The largest "cure" was in 1871—45,682 hogsheads—and the least in 1829—700. Most of these fish were caught by the Seine on different parts of the Cornish coast, chiefly at St. Ives, in October and November. Since 1877 the quantities have greatly fallen off, and seining east of the Lizard has nearly died out. The greatest quantity taken was 14,848 hogsheads, in 1884, of which all, except 2,000 hogsheads, were caught by Drift Nets. During the seven years the price varied between 36s. and 80s. per hogshead, on shore. The pilchard fishery in Devon is, comparatively speaking, now unimportant, the few stations—Bigbury Bay, Burr Island, Start Bay, and Teignmouth—having been unfortunate for many years.

Trawling is more interesting to us, as Devonshire men, than any other kind of fishing in these days, as it is more extensively carried on by our own county fishermen than any other method, has been increasing more steadily than the rest, and is of more modern development.

It is generally supposed to have been begun about 150 years ago; and, so far as its earliest adoption in Great Britain, it is conceded that Devonshire men were the first to practise it, and were the pioneers in prosecuting its operations in the North Sea, eventually settling at Ramsgate, Hull, Grimsby, and Lowestoft.

Less than fifty years ago the number of trawling vessels fishing in the North Sea was very small; but during the last twenty years Trawling has increased a hundredfold; and since the intro-

duction of ice as a means of preserving the fish in a fresh state, the delivery has extended enormously. The Fishery Commissioners, in 1866, estimated the supply of Trawl fish to the London market as equal to the supply of cattle. Since then the increase has been still more extensive, and, no doubt, has equalled in bulk and value the deliveries of the Drift Net fish during the same period.

Our own Western Trawl Fishery has also been gradually increasing; but cannot compare with the enormous advance of those ports I have mentioned.

The construction of the Trawl Net is entirely different to any other appliance in use for fishing, and is of a very ingenious description. It is made by hand, whilst the Seine and Drift Nets are made by machine.

The centres of our Western Trawling Fishery are Brixham and Plymouth, and it employs the most important of our fishing-boats, especially as regards size. The fish caught by the Trawl Net are sole, turbot, brill, plaice, hake, ray, conger, whiting, gurnards, and ling, and the kinds of fish generally taken at the bottom of the sea on our coast. The grounds where our trawlers fish reach from the Wolf in the west to Portland in the east, stretching across the English Channel to within sight of the Caskets; depending, of course, on the time of the year.

It will be seen, moreover, that our Trawl Fishery is of considerable importance, when I state that there are belonging to Brixham and Plymouth over two hundred trawling vessels, of an average tonnage of forty tons register, employing about 1,000 hands. Brixham possesses 144 trawling vessels, insured for £88,000, or averaging say £600 each. Belonging to our own port there are between seventy and eighty, insured for £300 each (about), which does not show so great an average as at Brixham.

The rig of our trawling-smacks is principally cutter (though a few are dandy-rigged—the rig almost universal in the North of England), which is for all purposes on this part of the coast the best rig, as it secures the maximum of speed with average wear and tear, speed being an essential element in a first-class Trawler with us.

The custom among our trawling fishermen is to go to sea on Monday mornings and return again, if successful, on the following day or the next; often the same day, according to weather.

In operating with the Trawl Net considerable tact is necessary. The Trawl fisherman must acquire a knowledge of the bottom of the sea, as well as be able to navigate his craft; for if he should drag his net over a rocky bottom, he immediately becomes stopped in his fishing operations, and suffers considerable loss by losing his nets, &c. A perfect knowledge of the tides is also necessary, as good fishing often depends on the tides, as well as other natural causes. Sometimes, when the tides are very strong, it is difficult to tow the net so successfully as when the tide is running more moderately; and there is no doubt fish are influenced by tide as to their locality. This the fisherman soon finds out to his cost. The best fishing is always attained when it is suitable to tow with the tide and wind.

Drift Fishing, as the name implies, is that practised by those of our fishermen who fish for mackerel, herrings, and pilchards with the Drift Net; the net being thrown over at random, and allowed to drive whither tide and wind may carry boat and net.

This kind of fishing is generally increasing, and it is a most important one. At present it is by far the largest fishing industry of Great Britain, and in it nearly 40,000 men and boys find employment.

The boats engaged in Drifting are generally lugger-rigged, which no doubt is the best, as it facilitates the working of the nets, and the lug-sail affords greater speed than any other. Taking into consideration the cost also, it is more economical, and is less expensive to keep up.

The Mackerel Fishing is of considerable interest to us, and for some years past has been fairly successful. It begins in January off our own port, and is prosecuted by a large fleet of boats from several ports. Besides our own West of England fishermen, many come from Lowestoft, Yarmouth, Hastings, Brighton, Lynn, Eastbourne, and Shoreham, and fish up to April. The Cornish season is then in full swing; and during the busiest time here, it is no uncommon thing to see as many as three hundred boats in Plymouth Harbour for this important fishing.

Some remarkable catches of mackerel are sometimes secured off this coast, and during last season a Porthleven boat—the *Boy Bob*—landed no less than 20,000 fish from one night's fishing, which

realized the handsome sum of £306. Some others were altogether unfortunate, and scarcely earned as many shillings, and some even lost several of their nets during that week. This boat earned for that week £356 5s. 6d., which is a very unusual sum.

The Drift Pilchard Fishery has for a long time been very energetically worked ; but, on the whole, it cannot be considered as very prosperous, and in the future its prosperity will very considerably depend upon the success of the Pilchard Seine Fishing.

The boats employed in this fishing are smaller than those used in mackerel fishing, but of the same rig. It is prosecuted nearer the shore than the mackerel. The nets used are similar in construction, with this difference, that they are sunk several feet below the surface of the sea ; whereas when fishing for mackerel, the nets are so arranged that they are level with the surface.

The Drift Herring Fishery is not of very great importance in these parts, though sometimes we get some satisfactory catches.

The next important method of fishing is Hooking, both by Hand-line and by Long-line, or Boulter. Hand-line fishing is that method of fishing in which you simply attach one hook to the end of a line, with a weight connected to sink it, and, with suitable bait, fish for your prey in the orthodox fashion, waiting till you get a bite, and then, with care and great glee, pulling your capture on board. The principal kinds captured by this fishing are conger, ling, cod, whiting-pollock, hake, and ray ; and they often afford good sport, as well as a trial of the fisherman's patience.

The Long-line, or Boulter, is an improvement on the Hand-line in some respects, and especially for certain kinds, such as conger, skate, ray, and ling ; but for whiting and hake the usual Hand-lines are preferable. The Long-line is made as follows : A number of hooks are fastened to what is called the Boulter, at some $1\frac{1}{2}$ fathoms apart. When the hooks are baited, they are let down to the bottom, and remain there for a tide-time, when the fishermen haul them on board again, which is not always very easy work. Four thousand hooks are shot at a time by one Boulter in this fishery, spreading over a considerable stretch of ground. Hookers are generally dandy-rigged, and are very suitable for this work.

The centres of operation of the respective fishings of the West are as follows :

Pilchard-seining. Cornwall : St. Ives, Padstow, Newquay, and Mount's Bay. Devonshire : Seining is practically at a standstill. Mackerel-seining. Cornwall : St. Ives, Mount's Bay, Mevagissey, Looe, and Cawsand. Devonshire : Brixham, Torquay, Paignton, Teignmouth, and Dawlish.

Trawling is chiefly prosecuted by Brixham and Plymouth fishermen, and the fishing-ground spreads from the Wolf to Portland, and across the Channel, according to the time of the year, in sight of the French coast.

Drift fishing is carried on mostly in Cornwall and Plymouth ; and, in the case of the mackerel-fishing, during the month of May, it is no uncommon thing for our Cornish boats to go as far as 100 miles N.W. of the Land's End, and even as far as off Ushant.

Hooking is chiefly prosecuted by Devonshire fishermen. Our own Plymouth fishermen may be considered to be more deeply interested in this fishing than those of any other port, especially in the Long-line fishing, which has received considerable impetus during the past three years.

Lobster and Crab fishing is prosecuted both in Cornwall and Devonshire ; but it does not rank in anything like importance with the foregoing, and has made very little progress during past years.

The following figures will give some idea of the extent of our fishing industry : In Cornwall there are over 300 luggers engaged in the mackerel fishing, carrying from five to eight hands each, a total of 2100.

In connection with the pilchard fishing there is a similar number of boats engaged.

In Plymouth the number of mackerel luggers is 20, which are also engaged in the herring and pilchard fishing during the respective seasons.

Trawlers, as already given : Plymouth, 70 to 80, with 300 men and boys ; Brixham, 144, with 700.

Taking the two counties together, there are no less than 10,000 men and boys actively engaged in our local Fisheries.

The Western Fishery has, on the whole, been steadily increasing in the number of men and boys employed ; while, so far as regards

the fishing-boats, it has very materially improved in every branch during the past fifteen years. It possesses some of the handsomest and swiftest craft of Great Britain, though in size we cannot compare with the boats of other parts of England and Scotland.

During the past and present years the severe depression which has been felt by our country has also made itself manifest in fisheries, and a considerable falling-off in earnings has been the result. It is also to be regretted that the supply of Trawl fish has been considerably less at Brixham and Plymouth. The chief failure has been in the hake fishing, which has indeed been going back for some years past. From Brixham I have received information that the supply of soles has very seriously decreased lately, and that there is very little sign of any improvement in the species.

The Board of Trade returns show that 14,014 tons of fish were carried inland by rail in 1884 from the following Devon and Cornwall ports, showing an increase on the previous year: Plymouth, 2,711 tons; Brixham, 1916; Torquay, 1126; Teignmouth, 763; Exmouth, 434; Kingswear, 199; Starcross, 116; Sidmouth, 63; Dawlish, 13; Topsham, 7; Penzance, 4059; St. Ives, 2199; St. Austell, 355; Marazion, 38; Hayle, 15. Taking the ton of fish as equal to 38 sheep, we see that for food purposes this inland supply is equal to a flock of 392,392. All this food is brought to our shores day by day without any trouble of production; but there is every reason why we should do our part to help in the improvement of fishing enterprise.

The results of fishing are always uncertain, and no two seasons over the same ground are alike.

The hake fishing is perhaps the most striking case at present. It has fallen off much during the last few years; and it is singular, so far as Brixham is concerned, that the great scarcity there dates from the very year (1868) when there was a strike among the Brixham fishermen. For some few years it has been noticed that hakes have been fairly abundant on the Irish coast, and I have no doubt myself but that, in coming to our shores from the Atlantic, they struck across to the Irish coast, probably in search of food, and that other natural causes having been favourable they have remained there during their regular course, and again returned to the Atlantic, and back to the Spanish coast.

A fresh start has taken place with some of our Brixham and Plymouth fishermen (Trawlers), in fishing the Irish Sea in small fleets, and bringing their fish to Plymouth and Brixham by carriers, the fish being well iced. This enterprise has, on the whole, succeeded, and marks quite a new phase in the experiences of our fishery, though it is only practicable during the months of April, May, June, July, and August. Some very superior catches were secured by our men, and there is every prospect of this becoming a valuable fishery.

So far as local circumstances are more or less favourable, our men have met the ever-varying conditions of our fishery, and have adapted themselves to take the full benefit of any opportunity to develop it; but we cannot hope to see it grow to anything like the proportions of the great fisheries in the North.

The distribution of fish is a matter of the utmost consideration, and its record, past and present, is not at all unsatisfactory. Before railway days, it was the custom of our fishermen to carry Neptune's hosts to those ports where the best markets were procurable, and a constant trade was carried on from Plymouth to Portsmouth, Southampton, and Weymouth, as circumstances warranted, and according to the state of fishing. Hakes and mackerel were the principal sorts so treated, the fastest of the craft being thus engaged in this important traffic. The same kind of thing happened in connection with the fishery of Cornwall; and Swansea, Cardiff, and other ports in the Bristol Channel, were kept supplied.

It was, however, the custom to post considerable quantities of mackerel and other kinds—as soles, turbot, and brill—to Exeter, Bristol, Bath, and even to Birmingham, by road. This method was not only costly, but very difficult; and it can easily be imagined that the fish, ere they reached their destination, had lost their special freshness, and exchanged it for quite another flavour.

The Railway Revolution has changed all this. You can now, if you happen to be staying in any of these towns, have your table served up with these tempting creatures on the same day, or the following morning of the night or day of their death, and hundreds of villages now are supplied with fish that were completely beyond reach in past years. And if at any time you may be in Paris, you can be regaled with a mackerel, or sole, or ray,

which only fifty hours before was struggling to get free from our fishermen's fatal grip.

After a few remarks upon Fishing Legislation, the lecturer proceeded :

Good harbours, for the protection of our fishing vessels, are of more than ordinary importance. Many of our fishing ports suffer considerably from a dearth of harbour accommodation. Brixham, Mevagissey, Newlyn, and St. Ives, for years past have been fighting against enormous difficulties in this respect, and thousands of pounds of damage have been done to our fishing fleet during the past few years, through want of harbour accommodation.

Newlyn has begun to deal with this in a very determined way, by the erection of a south pier, or breakwater, to be followed by a northern arm, which, when completed, will give shelter to many hundred boats.

St. Ives is also beginning to stir, and it is to be hoped that other fishing ports will be able to follow on, and build new harbours, or improve their present inefficient ones.

It is satisfactory to know that a considerable number of our fishermen belong to that valuable arm of our Volunteer forces, the Naval Reserve, and that its popularity among them does not decline, but is increasing in favour.

Just a few words about the fishermen themselves, and I have finished.

It is generally supposed that they are a rough and uncultivated class of men ; but this is not entirely the truth. Fishing is a rough-and-ready calling, and admits of no squeamish formalities. Having to battle with the forces of Nature, by day and night alike, under most trying circumstances, makes them appear somewhat unrefined ; yet under this there is a fellow-feeling that is both strong and tender, and which is transparent to a degree whenever circumstances call it forth. And, though unlettered, they are most sagacious ; for they can navigate their boats in all weathers, and at all times, with an accuracy that is perfectly astonishing, and very frequently act as pilots in the middle of the sea to captains of large vessels, who are supposed to be not only sailors, but nautical men in the strictest sense of the word. And as one of themselves, I would humbly ask any who feel an

interest (and I know I am speaking to many who have shown no little consideration towards them) to take no notice of their harmless foibles, but to look upon them with a kindly eye. Assist to provide them with interesting literature for perusal at sea, and pleasant recreation when on shore, and depend upon it you will find them to be as gentle as they are strong and courageous. They man nearly all the lifeboats around our coast, and their acts of courage are a glory to our nation.

CHARACTERISTICS OF THE FINE ARTS.

SYLLABUS OF PAPER BY GODFREY EVANS.

(Read 3rd December, 1885.)

INTRODUCTION. Imagination. Invention. Beauty and Imitation. Architecture. Painting. Sculpture. Music and Poetry. Historic epochs: Egyptian; Grecian; Roman; Byzantine; Gothic and Renaissance. Conclusion.

THE MONUMENTS AND REGISTERS OF SOME OF OUR LOCAL CHURCHES.

BY ARTHUR J. JEWERS, F.S.A.

(Read December 10th, 1885.)

OUR subject is the Monuments and Registers of some of the churches in this neighbourhood. It will be these, and not the churches themselves, that will be treated of in this paper. The monuments in a church must always have an interest apart from their genealogical value. Like architecture and dress, they have their different periods—from the simple coffin-shaped stone, on which later we find a cross cut, and at the top of which after a time appears a head, or larger portion of the human figure, which developes into the recumbent effigy. These reached their richest state in the Tudor period, and with that age died out. Mural monuments of large size—generally with arched canopies, and often with semi-recumbent or kneeling figures—date from the time of James I., and disappear with the House of Stuart. Brasses, either on the floor or on table or altar tombs, were in use from the beginning of the thirteenth century, but fell into disuse about the first quarter of the seventeenth. There is in the church of St. Columb Major a brass for John Arundell, Esq., who died July 22nd, 1633; but memorials of this kind are seldom met with so late. About the middle of the eighteenth century was introduced the style—if it can be called one—of angular slabs of cold white marble, still much affected. We have said nothing of coloured glass, which, prior to the Reformation, was much used for the display of commemorative shields, and sometimes the portraiture of the deceased, with the pious injunction, “Pro animo,” preceding the name, which led to their general destruction by the Puritans and others in the seventeenth century.

It does not, however, come within our limits to deal with

monuments generally; and the same remark applies to Parish Registers. It will be sufficient for our purpose to say that after the suppression of the religious houses, a mandate was issued by Thomas Cromwell, Vicar-General, in 1538, for the keeping of Registers of Baptisms, Marriages, and Burials. In the reign of Elizabeth it was ordered that every clergyman on his institution should sign a declaration to keep the Registers as required. But this not being done regularly, in 1597 it was ordained that parchment register books should be purchased at the expense of the parish, and such Registers as existed transcribed into them; and it was further ordered that copies of the Registers were to be taken to the registrar of the diocese every year, within one month of Easter. Unfortunately these orders were seldom observed. Since then various acts have been passed relating to registration, but no adequate measure has been introduced for the preservation of the Registers themselves; and they have, to a considerable extent, perished from carelessness and neglect, and often from wilful destruction. Many are fast dropping to pieces from damp and age, and nothing but a speedy transcript can save them. These records are simply priceless; they afford the richest mines of information to the genealogist. Who is to say what will or will not be of value? What one passes over will be what another seeks. We mourn aloud the loss of such large numbers of these records, and yet as a country we neglect to take the necessary steps to secure what is left of them, which might be done at a very small cost annually, spread over a number of years. This, however, I have dealt with elsewhere.

In a few parishes the Registers exist from the time they were first instituted, but in very many they do not go back beyond the middle of the seventeenth century, and in some cases they do not exist before the early part of the eighteenth century. The Bishops' transcripts are very imperfect—in fact, merely fragments—but they sometimes supply information not in the Register itself. The condition of Registers varies, from the well-kept volumes at the churches of St. Andrew and Charles in this town to a few fast-decaying and half-obliterated leaves, which alone are left in many parishes to represent the earlier Register.

The entries themselves vary greatly; from the elaborate entry occupying the whole of one page of a large folio book of Registers, as at St. Thomas, Portsmouth, where, with a grand flourish of

penmanship, is recorded the marriage of King Charles II. and the Infanta Catherine of Portugal, down to the cramped notice that John Smith and Mary Jones were married, jammed in between two other entries, or perchance written up and down the margin, having been, as the record states, "*omitted in its proper place.*"

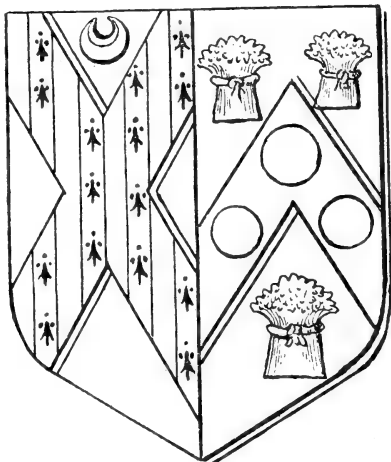
The first church to which we propose to refer is Rame. This church, which has recently been completely restored, is situated near the Rame Head, and within a few minutes' walk of the edge of the cliff beneath which break the restless waters of Whitsand Bay, the sound of whose troubled waves, as in stormy weather they roll with thunderous crash on the rocks beneath, mixes with the voices of the worshippers in this lonely fane.

This ancient building, which was consecrated as far back as A.D. 1259, is one of the very few old churches in Devon and Cornwall with a spire, and is in such a solitary spot, so comparatively barren, so out of the world, and with so few attractions according to modern ideas to induce a residence, that one might well expect to find no monumental records of persons of wealth or social standing having made it their habitation; but such is not the case. The monuments are not those of the territorial lords whose line stretches into the dim shadow of the remote past. The family of Rame of Rame had merged into that of Dernford of East Stonehouse and Rame, whose heiress had conveyed this manor to the lordly house of Edgcumbe, more than a century before the date of any of the existing monuments, the most important of which it will be seen commemorate families connected with Plymouth.

The most prominent, and therefore the first to arrest attention on entering the church, is a large monument near the east end of the south aisle. It consists of a heavy pediment supporting two pillars, from which rise an arch. Within this is a black marble tablet, with this inscription:

To the memory of
John Battersby of Rame in the county of
Cornwall Esq^{re} who Departed this Life July 27 1672
and with 2 sons and 2 daughters
which he had by his wife Grace Daughter
of Nicholas Opye of Plymouth in the County
of Devon Esq^{re}, Lyeth near this place.

In the upper part of the arch are the arms of Battersby impaling Opye; viz: *Or, a saltire paly of eight, erminois and gu.; differenced by a crescent sa. in chief, the mark of a second son:*



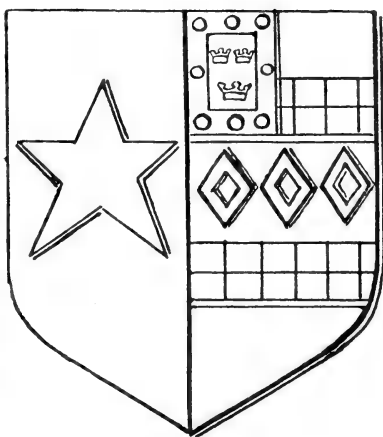
imp., Sa. on a chev. betw. three garbs or, as many hurts. Over the pillar, to the left, is the coat of Battersbye, over that on the right, Opye; while the arms of Battersbye are repeated on the pediment. This John Battersbye was the second son of Nicholas Battersbye, of Harrabear, and was baptised at Calstock, 3rd June, 1623. He was here buried, according to the Register, 29th July, 1672. His will, dated 11th

June, 1672, was proved in London, 4th March, 1673. (P. P. C. Pye, 32.) In this will he is styled of Rame, in the county of Cornwall, Esquire. He leaves to the poor, at his wife's discretion, £5; to his son George, £300; to his daughter Elizabeth, £400; and to his daughter Sarah, £300—to be paid to them at the age of twenty-one years, or earlier if married with the consent of their mother, with interest at six per cent. from the date of his death. If either died without heirs, their share was to be divided between the survivors. If all of them so died, the whole to go to his eldest son and heir, Nicholas Battersbye. To Grace, his wife, he bequeaths all his plate, jewels, rings, a necklace of pearls, &c., and appoints her, with Roger Porter, Esq., William Trevisa, junr., gent., Richard Opie, gent., his brother-in-law, and William Battersby, gent., to be guardians and overseers of his will, until his son Nicholas is of the age of twenty-one years. He also mentions his houses at Ford and Cawsand, conveyed to him and his heirs by his brother-in-law, Nicholas Opie. The will is witnessed by William Opie, Patience Edwards, John Opie, and Thomas Opie. In a codicil he names lands, &c., in the parish of Uphill, co. Somerset, which are to be sold for the benefit of his son George. His wife Grace was the daughter

of Mr. Nicholas and Mrs. Susan Opey, and she was baptised at St. Andrew's, Plymouth, 4th July, 1641. They were married at Rame, 4th June, 1662, as John Battersby, Esq., and Mrs. Grace Opey, as appears by the Register. Colonel Vivian only names four children (*Visitation of Cornwall*, p. 21)—viz., Nicholas, George, Elizabeth, Sarah—but there must have been another, as we find the burial of Susanna, daughter of Mr. John Battersby, recorded 14th January, 1663. Her baptism is wanting; but that of Nicholas is entered 20th February, 1666; and Sarah, 17th September, 1668. The baptism of Elizabeth is also wanting, but her marriage, on the 4th July, 1689, as Thomas Johns and Mrs. Elizabeth Battersby, remains. This marriage and the dates from the Registers are not given in Colonel Vivian's pedigree, nor are the following, from the same source: viz., Christopher, son of Mr. William Battersby and Mary his wife, baptised 2nd January, 1665; Isaak, son of Mr. William Battersby and Mary his wife, baptised 11th February, 1669. This William was a brother of John Battersby above, and is mentioned, but without his wife or sons, in the pedigree referred to. John Munyon and Annie Battersby married 6th July, 1670. This Annie was probably a sister of the above John Battersby.

The next mural monuments in point of age and importance are two in the north transept commemorating Roger Ashton, D.D., and his children; the latter is the oldest and largest, and is of black and white marble, with the arms of Ashton and Warren; viz.: *Arg. a mullet sa. : imp. Arg. betw. two bars componee or and az. three mascles sa., on a canton of the fourth as many coronets of the second, within a bord. gu. bezantée.* The inscription is:

Heare Lye the Body of Mary and
Anne daughters of Roger Ashton
Doctor of Divinity and Margaret his
wife who died in the yeeres 1664
and 1667, also a son of theirs
Departed this Life the same hour
it began to live 1666.



The monument commemorating the father and mother bears the following inscription :

To the memory
of the Revere'd Roger Ashton Doctor
of Divinity of St
Andrew's church in
Plymouth who died on
the 27th day of March 1677
and Margaret his Wife
who Died the 13th Day of
November in the same
year and lie buried
neere this place.

From the Parish Register we learn that Dr. Roger Ashton, of Plymouth, and Mrs. Margaret Warren were married in Rame Church the 13th February, 1663, and also that their daughters were buried, Mary on the 5th January, 1664, and Anna on the 8th February, 1667. On the 29th March, 1677, the burial of Dr. Ashton himself is recorded, and on 16th November, 1677, his widow, Mrs. Margaret Ashton of Plymouth. The reason of the Ashtons choosing Rame as their burial-place was undoubtedly the fact of Mrs. Ashton being a daughter of Robert Warren, the rector, memorials of whose family we shall shortly notice.

The remaining mural monuments are comparatively modern, and are simply inscribed tablets. One tells us that Stephen Edwards, of Rame Place, in this parish, died 16th January, 1756, aged 42 ; and that Mary, his wife, followed him to the grave on the 9th February, 1797, aged 86.

In the north porch are three oval marble tablets ; they are :

1. Sarah, wife of Thomas Hunt Ley, clerk, who died 16th November, 1857, and was buried at Cumner, Berks.
2. Elizabeth Ommaney Ley, died 4th February, 1860.
3. Thomas Hunt Ley, many years rector of this parish, died 4th March, 1866.

The east window is also a memorial of this clergyman, who, as the inscription in the lower part of the window informs us, was for "45 years Priest of this church."

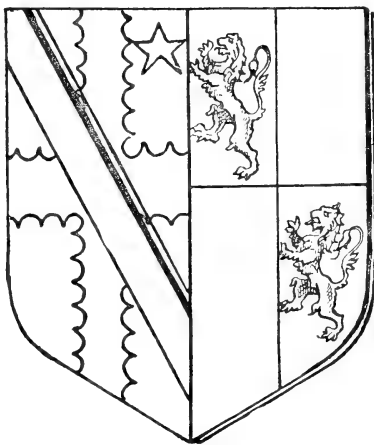
A marble tablet formerly recorded that this church was consecrated in 1259, A.D., and restored in 1848. That restoration must have been very partial and imperfect ; the church has been

now thoroughly renovated and restored, and a marble slab with the following inscription records the fact :

Consecratum
Anno Salutis
1259
In Honorem
Deo Optimi Maximi
Restauratum
1885

In the course of the restoration one of the original beams had to be cut, and a portion of it is now in the Museum of this Society.

We will now turn our attention to the memorials on the floor ; for this church is, for its size and situation, rather rich in armorial ledger-stones. These, with one exception, are in memory of a Plymouth family, from whom one of the streets derives its name. The largest of these ledger-stones has five shields of arms on it ; but until recently one half was covered by the high and unsightly pews, thanks, no doubt, to the restoration of 1848. Round the edge is this inscription : "Here Lyeth the body of Mr Stephen Trevill of Plymouth merchant who Departed this Life the XXII Day of May Anno Domini 1647." In the centre are the arms of Trevill impaling Pollexfen ;



viz., (Or) a cross eng. (sa.), surmounted by a bendlet (gu.), in chief a mullet for the difference of a third son : imp. Quarterly (arg. and az.), in the first and fourth a lion ramp. (gu). At each corner a shield, each charged with the coat of Trevill alone.

A smaller stone is in memory of Stephen Trevill, of this parish, who died 2nd October, 1625, and has the coat of Trevill alone—*A cross eng., surmounted by a bendlet.*

Another ledger-stone is for Mr. John Trevill, of this parish, gentleman, who died 1st November, 1648. Arms—*A cross eng., surmounted by a bendlet.*

Yet another records that "Here Lyeth the body of Elizabeth, the Daughter of Stephen Trevill, of this parish, merchant, who departed this life the 27th Day of December, 1650." The arms on it are Trevill—*A cross eng., surmounted by a bendlet, and in chief a crescent for difference of a second son: imp. On a chev. betw. three garbs, as many roundels*; Opie. Beneath this shield is the following inscription:

Vitæ quid ad mortem,
Quid mors nisi Janua vitæ,
Quæ vitam crepuit mors,
Mihi vita fuit.

Thus our ancestors philosophized over their departed relations and friends; for in various forms we often find the same sentiment as that expressed in the above lines, which may be thus translated:

What is life to death?
What is death but the gate of life?
Death, which snatched away life,
Was life to me.

Nor has this practice of moralizing over the resting-places of our dead yet died out. It must be observed here that the arms are not, strictly speaking, used correctly; they are those of the parents of this Elizabeth Trevill. The arms of Trevill alone in a lozenge should have been at the top, and the impaled coat might have been added to show her parentage. There are several entries in the registers relating to the Trevill family; but as they have already been printed in the paper on "Local Heraldry," it is needless to repeat them here. The father and mother of Elizabeth—Mr. Stephen Trevill and Mrs. Jane Opie—were married at St. Andrew's, Plymouth, 30th December, 1647. It may be well to mention here that in the paper above referred to the word "wife" has, by oversight, been printed instead of "daughter."

Another floor-slab has a large well-cut shield of the arms of Warren of Hedbury, in Ashburton, granted 14th March, 1623, or rather confirmed; for the arms were allowed at the Visitation of 1620. The arms on the stone are *Betw. two bars componee three mascles, on a canton as many coronets within a bord. charged with eight roundels*. The inscription, which runs round the edge of the stone, reads, "Here Lyeth the Bodie of Robert Warren, Rector of Rame, who Died the 7th Day of February 1658." He was the

eldest son of Christopher Warren, by Alice, daughter of Thomas Webb, of Sydenham Damerell (married there 15th June, 1613, as Mr. Christopher Warren and Alice Webb; *vide* Par. Reg.), and his baptism is there recorded as having taken place on the 8th October, 1615; a sister, Anne, having been baptized 1st May, 1614, and a brother, Richard, on the 15th August, 1619, as we learn from the same valuable source of information—the Parish Registers. Robert Warren married Margaret, daughter of Peter Burgess, of Petertavy, by whom he had five sons and two daughters; viz., Christopher, Robert, Thomas, Peter, Nathaniel, Margaret, and Anne.

The following are some extracts from the Registers :

BAPTISMS.

- | | | | |
|-------|-------|-----|------------------------------------------------------------------|
| 1655. | July | 30. | Nathaniel, son of Mr. Robert Warrin. |
| 1671. | Oct. | 13. | Margaret, daughter of Mr. Robert Warren and Priscilla his wife. |
| 1673. | Dec. | 17. | Priscilla, daughter of Mr. Robert Warren and Priscilla his wife. |
| 1675. | March | 15. | William, son of Mr. Robert Warren and Priscilla his wife. |
| 1677. | May | 30. | Mary, daughter of Mr. Robert Warren and Priscilla his wife. |
| 1681. | April | 22. | John, son of Mr. Robert Warren and Priscilla his wife. |
| 1683. | Aug. | 10. | Robert, son of Mr. Robert Warren and Priscilla his wife. |
| 1685. | Sept. | 23. | Sarah, daughter of Mr. Robert Warren and Priscilla his wife. |
| 1687. | Oct. | 11. | Thomas, son of Mr. Robert Warring and Priscilla his wife. |
| 1689. | Oct. | 25. | Ann, daughter of Mr. Robert Warren and Priscilla his wife. |

WEDDINGS.

- | | | | |
|-------|-----------------------------------------|-----|-----------------------------------------------|
| 1663. | Ashton and Warren, see Ashton monument. | | |
| 1670. | Dec. | 27. | Mr. Robert Warrin and Mrs. Priscilla Granger. |
| 1686. | May | 21. | Robert Warren, Esq., and Mrs. Jane Bagatz. |

BURIALS.

- | | | | |
|-------|-------|-----|------------------------------------------|
| 1661. | April | 14. | Anne, daughter of Robert Warren, Rector. |
| 1668. | Feb. | 10. | Mr. Robert Warren, Minister of Rame. |
| 1688. | June | 14. | Thomas Warren. |
| 1690. | April | 12. | Mrs. Margaret Warren. |
| 1690. | Oct. | 10. | Mr. Robert Warren, Rector of Rame. |

In the Parish Register of Sheviock we have the baptism, on 7th May, 1679, of Grace, daughter of Robert Warren, clerk, Rector of Rame, and Priscilla, his wife.

Beside the floor-slabs already referred to, there are the five following, for :

Alice, wife of Robert Seaman, Parson of Rame, who died 13th February, 1633.

Robert Seaman, Parson of Rame, who died 2nd April, 1644.

Paschoe Kempe, of Rame, died 18th July, 1628.

Aquila Blake, son of John Blake of this parish, died 3rd December, 1631.

Joan, wife of Stephen Edwards, who died 8th August, 1733.

Also an almost obliterated stone for Jone, wife of Pascoe — The rest is quite gone, but probably the Paschoe Kempe named above.

These bring us to the end of the monuments within the church, and with the headstones in the churchyard we do not propose to deal.

Turning to the Registers, which have already been quoted, we have to lament decay and loss, as is too often the case. They do not exist at all prior to the middle of the seventeenth century, and what still remain appear to be very imperfect.

Besides the extracts already given, the following are worth noting :

BAPTISMS.

1655.	July	12.	John, son of Stephen Spiller. ¹
1671.	March	27.	William, son of Peter Hobblin and Fillip [pa.]
1671.	April	23.	Flower, daughter of John Hele and Mary.
1680.	Jan.	31.	Stephen, son of John Spiller and Priscilla.
1683.	Feb.	25.	Jacob, son of Jonathan Howard and Abagall.
1684.	Sept.	22.	Robert, son of Samuel Skelton and Joan.
1686.	Feb.	21.	John, son of John Spiellier and Priscilla.
1689.		25.	Anne, daughter of John Spiller and Presilla.
1689.	Feb.	3.	William, son of John Gennys and Thomasin.
1691.	May	24.	William, son of John Spiller and Prescilla.
1692.	Jan.	22.	Prescilla, daughter of John Spiller and Prescilla.
1695.	April	24.	Samuel, son of Mr. Samuel Beer and Elizabeth.

¹ This name also appears in the Registers of Sheviock, where, on 16th September, 1599, William Bond, Esq., and Mercy, daughter of Ferdinando Spyller, were married. The family of Spiller appear to have been one of a class who are numbered with the things of the past, farming their own small estates, and using armorial bearings. The coat recorded for Spiller of Bodmin is, *Per pale arg. and sa., a horse pass. counterchanged.* This coat, quartered by Lanyon, appears on a large mural monument of the Rashleigh family in Fowey Church.

1700. Sept. 10 (born 5th September). Prescilla, daughter of John Spiller and Prescilla.
1701. Oct. 24 (born 4th October). Thomas, son of Hugh Nevell and Anne.¹
1701. Dec. 13. Honour, daughter of James Halse and Ann.
1720. Dec. 16. Matilda, daughter of Thomas Wolridge, Rector of Rame and Eve.
1725. Feb. 19. John, son of Thomas and Mary Nankivel.
1739. Nov. 25. Ann, daughter of William and Ann Arundle.
1746. Nov. 27. Joane, daughter of William and Joanna Warne.
1747. Aug. 9. William, son of John and Mary Gould.
1747. Feb. 12. John, son of John and Elizabeth Searle.
1754. April 15. Elisha, son of Elisha Arundle and Elizabeth.
1756. May 12. Roger, son of Elisha Arundle and Elizabeth.
1758. Feb. 15. Richard, son of Elisha Arundle and Elizabeth.
1761. Jan. 22. John, son of Elisha Arundle and Elizabeth.
1785. July 30. John, son of John and Joyce Baron.
1785. Aug. 5. Ann, daughter of Elisha and Ann Auredell.
1785. Sept. 23. Richard, son of John and Mary Arundell.
1785. Nov. 6. Jonathan, son of Jonathan and Philis Drake.
1786. June 4. Mary, daughter of George and Mary Edgcombe.
1787. July 24. Mary, daughter of John and Mary Arundell.
1787. Nov. 22. John, son of William and Jane Edgcombe.

WEDDINGS.

1655. April 12. John Taprill and Mary Spiller.
1667. May 9. Nicholas Mutton and Elizabeth Spiller.
1677. Feb. 5. Josiah Evans and Mary Spiller.
1689. April 24. Charles White and Ann Spiller.
1695. May 30. Thomas Wolridge and Mrs. Ann Mathew.
1705. July 14. Thomas Young, gent., and Mrs. Mary Wolridge of Creed.
1715. March 4. Trefusis Lovell and Margaret Masterman.
1718. Oct. 20. Thomas Wolridge, Rector, and Mrs. Eve Carleton at Maker.
1718. Nov. 7. Edward Downing and Elizabeth Spiller.
1719. April 19. Mr. Thomas Mangles and Mrs. Katherine How, by Licence.
1724. Nov. 17. Mr. Charles Orchard, clerk, and Patience Mayne, by Licence from Exon.
1725. June 15. Daniel Tom and Anne Little, by Licence from Exon.
1725. Jan. 19. Richard Hawkins and Grace Chenowah.
1737. Nov. 4. William Arendel and Ann Spriddle.

¹ There are other children recorded of this Hugh Nevell. Was this Hugh Nevell a scion of the great historic house of Nevill, whose fortunes fell so low in the reign of Queen Elizabeth, in consequence of the part taken by its head, the Earl of Westmoreland, and other members, in the Pilgrimage of Grace?

1739. April 20. John Spriddle and Martha Wicket.
 1750. William Spriddle and Joan Stephens.
 1754. April 3. Joseph Elvey, of the Parish of Bishops Gate, and
 Mary Nankevil, of this parish.

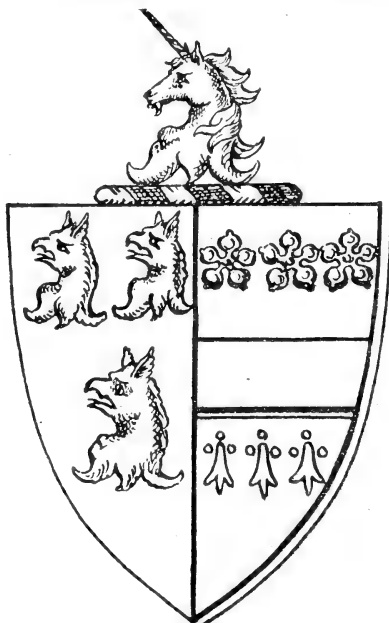
BURIALS.

1690. Oct. 21. Mrs. Priscilla Granger, widow.
 1695. Sept. 22. Mrs. Ann Wolridge.
 1700. March 26. Mrs. Ralph Wolridge.

With hearty thanks to the worthy rector, Mr. Evans, for his hospitable reception, and for the opportunity of quietly looking over the Registers, we must quit this pleasant though somewhat wild spot and take our way by a very hilly road through Millbrook to

A tiny church nestling at the foot of the hills which shut in that creek of the Hamoaze known as St. John's Lake, whose waters come up to the churchyard wall—a charming place, if the tide did not recede and leave banks of slimy mud during a large portion of time, and were the atmosphere a little less humid. In the church we shall find

St. John's-
by-Saltash.



little to interest us in the way of monuments. There is a loose shield having the arms of Beele impaling Bickton; viz., (Az.) *three griffins' heads erased (arg.)*: imp. *A fess betw. in chief three cinquefoil, in base as many erm. spots*. Crest, *A unicorn's head erased*. The only existing monument to which this shield could have belonged is that of Elizabeth Beele, daughter of Thomas Fisher, Esq., and Agnes, his wife; and the wife of the Rev. William Beele, who died 26th March, 1747, aged 42 years. This is recorded on a plain

marble tablet, but the arms impaled should be Fisher, which is

not the case. Gilbert, in his *History of Cornwall*, mentions a monument to the Beele family with these arms (*Az. three griffins' heads erased arg.*) but without any impalement.

There is a mural tablet in memory of John Sweet, yeoman, of Millbrook, who died 14th January, 1786, aged 71; also Isabella, his wife, who died 1st July, 1790, aged 81.

A mural brass plate bears an inscription for John Hext Boger, Esq., son of John Boger, Esq., of Wolsdon, who died 23rd June, 1865, aged 61. The east window is erected in memory of the Rev. James Campbell Crowley, rector of this parish, who died 22nd April, 1862; while a window in the south side of the church commemorates James Holmes Boyle, Esq., who died 31st December, 1864; and also Eliza Boyle, his sister, who died 3rd May, 1863.

In the yard, among others, is a headstone in memory of Martha, wife of John Luckraft, Lieutenant R.N., who died 24th November, 1833, aged 62; also Alfred, infant son of the above, who died 30th March, 1808.

Turning from the monuments to the Registers, we find that of the earliest part only two or three leaves, half decayed and obliterated, remain, their date being about 1582. They are in a thin volume containing all the registers down to 1793, the whole in a very bad condition; but they are not generally of much importance, though it is almost impossible to say what entries may or may not be of use at some time. The following appeared of some general interest:

BAPTISMS.

1639. ... son of William Lodge and Armanielle.
 1648. April 21. Elizabeth, daughter of Nicholas and Philippa Oltramere, borne 19th April. Minister.
 1652. ... William, son of Nicholas and Philippa Oltramere, borne 14th September.

(NOTE.—This uncommon name occurs in the registers of Brixton, where we find, in 1669, on May 19th, John Oltramare, clerk, curate of Brixton, and Mrs. Elizabeth Maynard, were married by Mr. Daniel More, vicar of Yealmpton.)

1682. Jan. 2. Robert, son of Robert Eare, Rector, and Honor.
 1683. Oct. 10. Richard, son of Richard Mapawder and Mary.
 1684. Oct. 22. Philip, son of Robert Eare and Honour.
 1711. July 24. Annie, daughter of Radford Herring and Dorothy.
 1722. Nov. 11. John, son of Mr. John Hughes and Sarah.
 1735. Jan. 18. Edmund, son of Edmund Prideaux, of St. Awstell, and Ruth.

1735. Nov. 25. Hugh, son of Philip and Elizabeth Littleton, of Maker.
 1767. Sept. 2. Margaret, daughter of Captain Robert Douglas and Jane.

WEDDINGS.

1646. Feb. 3. Nicholas Oltramare and Philip Gyll.
 1712. Oct. 30. Edmund Herring, of this parish, gent., and Loveday, daughter of Nicholas Glynn, of the parish of St. Neot, gent.

(Their son, the Rev. Edmund Herring, was married at East Anthony, 15th April, 1745, to Mrs. Elizabeth Wills; *Vide Par. Reg.*)

- 1714 Sept. 4. Captain Thomas Graves and Mary, daughter of Mr. William Warne, of the parish of Anthony.

(This Captain Graves was afterwards Admiral Graves, and father by his second wife of the first Lord Graves. The lady was the only child and heiress of William Warne of Thanckes, which estate went by this marriage into the Graves family; the house has been rebuilt by the present Lord Graves.)

BURIALS.

1622. ... Joanna, daughter of Peter Coffin, deceased.
 1623. Mar. 26. Margaret, wife of Nicholas Lodge, Rector.
 1639. ... son of Nicholas Lodge, Rector.
 1641. Nov. 28. Nicholas Lodge, Rector.
 1709. June 2. Mr. Robert Eare.
 1712. Sept. 13. Edmund Herring, gent.
 1713. Sept. 17. Anne Herring.
 1739. Dec. 6. Rev. Mr. John Torre, Vicar.
 1748. May 27. Radford Herring.
 1757. Sept. 19. Rev. William Beel.

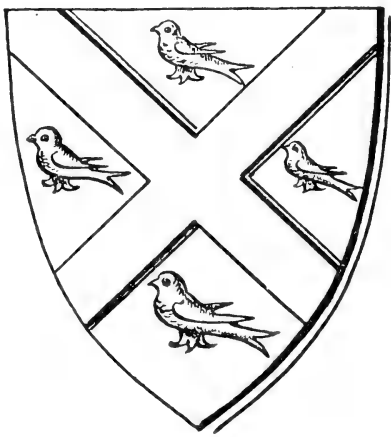
Sheviock is another of the few Cornish churches with a spire. It is perhaps less known than Rame, situated as it is in an out-of-the-way spot, nearly midway between St. Germans and Antony, and is reached by a pleasant walk from either place, though, lying on the Lynher, it can be got at by water. But we must not yield to the inclination to describe the scenery on the road, nor even the fabric of the tree-embowered sanctuary, which we will leave for those more especially acquainted with ecclesiastical architecture.

There is a singular local tradition which asserts that when the founder commenced the sacred edifice, his wife commenced the building of a barn, and that when both had completed their work and balanced accounts, it was found that the barn had cost the most. To say the least, this tradition does not credit Sir Edward

Courtenay with much liberality, or his wife with much piety. An adjacent barn is pointed out as the identical building; but it hardly bears out the story of its cost being equal to that of the church.

Entering the church, we find the monuments few and unimposing. The most interesting are three recumbent effigies; but no arms now remain on either to indicate whom they commemorate. There are several shields, which are now blank; but the armorial bearings of the persons to whose memory they were erected were doubtless originally painted on them. The two figures in the south transept are considered, with good reason, to represent the founder or rebuilder of the church, Sir Edward Courtenay, third son of Hugh second Earl of Devon; and his wife Emmeline, daughter and heiress of Sir John Dawney, of Sheviok, who is himself probably represented by the figure under an arch in the north aisle. Lysons say that the arms of Courtenay, impaling Dawney, were to be seen painted over the lady. The figures have been ably treated by Mr. W. H. H. Rogers, F.S.A., who gives engravings of them in his very valuable work on *The Sepulchral Effigies of Devon*.

The next, in point of age and interest, is a floorslab with these arms—(Az.) a saltire (arg.), betw. four martlets (or), and an inscription cut round the edge, recording the fact that John Smyth, gent., was buried 18th February, 1598. This is confirmed by the Register, where we read that “John Smyth, senior,” was buried on that date. This family was seated for a long period in this parish in a gentle position. Though the connection is not at present proved, it is most probable that this John was the son of John, second son of Thomas Smith, of Tregonack, in St. Germans. (*Vide Col. Vivian’s Visitations of Cornwall*, p. 427.)



The following entries from the Sheviocck Parish Register relate to this family :

BAPTISMS.

1625. Nov. 7. Francis, son of Thomas Smyth and Mary, his wife.
 1655. Feb. 10. Samuel, son of Mr. Nicholas Smyth and Martha, his wife, born 3rd same month.
 1658. May 20. Martha, daughter of Mr. Nicholas Smyth and Martha, his wife, born 3rd same month.

WEDDINGS.

1576. Sept. 9. John Smyth, gent., and Jane Penkevyl.
 1583. April 29. . . . Bond and Agnes Smyth.
 1610. Jan. 22. Thomas Smyth and Mary Arundell.
 1651. April 19. Mr. Nicholas Smyth and Martha Hitchins.
 1663. Sept. 30. Mr. John Blake and Mrs. Grace Smyth, both of this parish.
 1663. Oct. 15. Mr. Richard Rolle, Rector of this parish, and Elizabeth Smyth, the natural and legitimate daughter of Thomas Smyth, of the same parish, gent., by Licence.
 1683. April 17. Mr. John Deeble, of Antony, and Mrs. Martha Smyth.
 1683. June 25. Mr. Samuel Smyth and Mrs. Joan Evans, at Plymouth.

BURIALS.

1570. Mar. 14. Elizabeth, daughter of Mr. John Smyth.
 1579. June 6. John Smyth, gent.
 1598. Feb. 18. John Smyth, senior.
 1655. April 17. Ann, daughter of Mr. Thomas Smyth.
 1676. Nov. 20. Mrs. Martha Smyth.
 1701. Jan. 21. Nicholas Smith, gent., aged 87 years.
 1707. Sept. 9. Mrs. Martha Deeble.
 1710. Sept. 15. Mrs. Grace Blake, vid.
 1716. Feb. 13. Samuel Smith, being a gentleman.
 1721. Feb. 9. Mrs. Joan Smith, vid.

To these extracts the following remarks may perhaps add interest :

The small number of baptisms may partly be accounted for by the imperfect condition of the Register. The baptisms are entirely gone up to 1623, and are very much decayed for many years after.

The family of Hitchins were of St. Stephen's-by-Saltash, entered their pedigree at the Heralds' Visitation, and will be found noticed under the church of St. Stephen's-by-Saltash. The Blakes appear to be of the same family whose pedigree was

recorded in the Visitation of 1620. In St. Erney Church is a hatchment with the arms of Blake impaling Smith (*Arg. a chev. betw. three garbs sa. ; imp. Az. a saltire arg. betw. four martlets or.* Crest, *On cap of maintenance gu. turned up erm. a martlet arg.*). The dexter half of the hatchment is sable, showing that the wife survived ; but the date beneath the arms, 1770, is much too late for the above marriage—probably the impalement of Smith was continued in error.

The next monument to claim our attention is that of the "Rev. Mr. Samuel Deeble," as he is styled in the inscription, which records that he was for twelve years rector of the parish, and died 8th February, 1750, aged 57 years. It is also in memory of his daughter, Ann Deeble, who died 3rd September, 1761, aged 16 years and 6 months. This Samuel Deeble was a son of John Deeble, of Antony, a grandson of Oliver Deeble, who married Theophila, daughter and co-heir of Thomas Wolsdon, of Wolsdon, to whose memory there is a monument in Antony Church. In its Registers are many entries relating to this family, but beyond one we will not touch on them here. One point in this monument claims attention ; that is, the shield having a blank impalement, showing the family to have known the wife was entitled to arms, but to have been ignorant as to what they were, thus the blank was left, intending to communicate with her family, or otherwise ascertain ; for at that time there was no printed work giving a list of families, with their arms, to help them, such as *Burke's General Armory*, and intercommunication between places only one hundred miles apart was slow and difficult, particularly when they were off the main lines of communication. In this case they would wait for some acquaintance or messenger going in the required direction, who would perhaps have to pass it into other hands. The rector had married a lady presumably of the ancient Shropshire family of Sandford, as we learn from the Registers at Antony ; viz., 1747, May 14th, the Rev. Mr. Samuel Deeble and Mrs. Anne Sanford.

In the Register occur the following entries relating to Deeble :

BAPTISMS.

1690. Aug. 10. Anne, daughter of Mr. John Deeble and Martha his wife.
 1693. Sept. 29. Samuel, son of Mr. John Deeble and Martha his wife.
 1697. Dec. 27. Mary, daughter of Mr. John Deeble and Martha his wife.

WEDDINGS.

1652. Dec. 21. Robert Rod and Elizabeth Deeble, of St. Germans.
 1653. July 18. Thomas Harris and Jane Deeble, married by John Kendall, Esq., then Justice of the Peace for this County of Cornwall, as by his certificate under his hand and seale to mee hath been certified.
 1662. Feb. 2. John Sym and Aridice Deeble, both of the pish. of St. Germans.
 1683. April 17. Mr. John Deeble, of Antony, and Mrs. Martha Smyth.
 1747. May 14. Samuel Deeble, rector, and Mrs. Anne Sanford, of Tiverton, at Antony.

BURIALS.

1706. May 5. Thomas Deeble.
 1707. Sept. 9. Mrs. Martha Deeble.
 1731. April 14. Mr. Geo. Deeble.
 1732. Jan. 4. Mr. John Deeble, aged 82.
 1736. Dec. 31. Mrs. Mary Deeble.
 1737. Oct. 12. John Deeble, gent.

The representation of the Deebles of Wolsdon, is now vested in that of Boger of Wolsdon.

The next memorial to claim our attention is one to the Wallis family. It is a plain marble tablet, and records that John Wallis, Esq., of Stoke Damerel, died at Trethill, in this parish, in June, 1780, aged 67. Also Ann Wallis, his wife, who, having survived him for twenty-six years, died 20th January, 1806, aged 70 years. Their only child Ann, the wife of J. T. Duckworth, Esq., Captain R.N., and Colonel in the Royal Marines, died at Stoke, 20th August, 1795, aged 46 years, to whose memory, and that of their grandparents, her children erected this stone, as we are told by the inscription. An adjacent tablet records that George Wallis Duckworth died 21st May, 1811, aged 2 years and 9 months. Also Lieutenant-Colonel George Henry Duckworth, 48th Regiment, who fell at Albuera 16th May, 1811, to whose memories this tablet was erected by Penelope, mother of the former and widow of the latter. Another marble tablet commemorates a little daughter of Lieutenant-Colonel George Henry and Penelope Duckworth—Penelope Fanshawe Duckworth, who died at the age of 7 years, 3rd October, 1814. The husband of the above Ann Wallis became afterwards Admiral Sir John Thomas Duckworth, Bart., G.C.B., who was created a baronet 2nd November, 1813. They

had two children (1) George Henry—named above as being killed at Albuera—the death of whose only child, by his wife Penelope, daughter of Robert Fanshawe, Esq., Commissioner R.N., is recorded as mentioned above. (2) Sarah Ann, married in November, 1803, to Sir Richard King, Bart.

A mural tablet contains an inscription on brass in memory of Ann, eldest daughter of the Rev. Mydhope Wallis, of Trethill, in this parish, and widow of Dr. Bryan Roberts, Rector of Drewsteignton, co. Devon, and of St. John's, in Cornwall; also her eldest son, the Rev. Samuel Wallis Roberts, B.D., of Trethill, who died 16th June, 1863, aged 70; also of another son, Wightwick Roberts, Esq., who died at Trethill May 9th, 1872, aged 73.

The name of Wallis occurs in the Register of this parish as early as 1570. Philip Wallis, of Sheviock, claimed to enter his arms and pedigree at the Heralds' Visitation in 1620, but his claim was disallowed.

The following are from the Registers :

BAPTISMS.

1625.	Oct.	9.	Anne, daughter of Richard Wallis and Ursula his wife.
1626.	Dec.	...	son of Richard Wallis and Ursula his wife.
1626.	July.	22.	Peter, son of Oliver Wallis and Catherine his wife.
1644.	April	17.	Mary, daughter of Anthony Wallis and Amy his wife.
1656.	Nov.	1.	Richard, son of Mr. John Wallis and Mary his wife, borne 23rd October previous.
1656.	Jan.	30.	Anthonie, son of Mr. Richard Wallis and Isett his wife, borne 15th same month.
1657.	April	4.	John, son of Anthony Wallis, and Annis his wife, borne 22nd March, 1656.
1657.	Dec.	15.	Mary, daughter of Mr. John Wallis and Mary his wife, borne 4th same month.
1663.	Jan.	12.	Elizabeth, daughter of Mr. John Wallis and Mary his wife.
1664.	Oct.	22.	John, son of Mr. Richard Wallis and Iset his wife, and was buried the 26th of the same month.
1665.	March	21.	John, son of Mr. John Wallis and Mary his wife.
1666.	June	5.	Mary, daughter of Mr. Richard Wallis and Iset his wife.
1667.	March	12.	Richard, son of Mr. John Wallis and Mary his wife.
1670.	Oct.	25.	Jone, daughter of Mr. Richard Wallis and Iset his wife.
1672.	May	8.	Arthur, son of Mr. John Wallis and Mary his wife.
1694.	July	20.	Ferdinando, son of Mr. Henry Wallis, gent., and Elizabeth his wife.

1695. Dec. 17. John, son of Mr. Henry Wallis, gent., and Elizabeth his wife.
 1697. Nov. 2. Anne, daughter of Mr. Henry Wallis, gent., and Elizabeth his wife.

WEDDINGS.

1570. April 19. Oliver Wallis and Arg—— S(argent ?)
 1608. July 2. William Waren and Elizabeth Wallis.
 1609. Feb. 20. John Hichens and Elizabeth Wallys.
 1610. June 18. John Wallys and Susanna Carkeete.
 1616. Feb. 5. Ferdinando Wallis and Mary Peter.
 1636. April 28. Oliver Walles and Richard Bonny.
 1640. Feb. 10. Anthoine Wallis and Annis Pe (parchment gone).
 1643. ... — Hooper and Elizabeth Wallis.
 1644. Nov. 26. Robert Stevens and Pentecost Wallis.
 1649. Sept. 6. Mr. William Hobb and Ann Wallis.
 1657. A contract of matrimony between Mr. William Sparkman, of the pish. of St. Germans of the one pte., and Mrs. Mary Wallis of this pish. of thother pte. was in this pish. church published in the close of the morning exercise (without contradiction of anyone) three severall Lords dayes ; viz., the third, the tenth, and the seaventeenth dayes of May, in the yeere afores^d, 1657, by mee, Will: Jane, Register.
 1661. Dec. 17. Stephen Simon and Sibly Wallis, both of this pish.
 1667. Oct. 15. Charles Lang and Thomasin Wallis.
 1670. Nov. 26. Oliver Wallis and Eleanor Lavers, widow.
 1671. May 30. Oliver Wallis and Johan, daughter of Henry Lavers.
 1689. April 8. Anthony Wallace and Grace Sargent, widow.
 1691. Nov. 16. Oliver Wallis and Eliz. Austen, widow.
 1692. Nov. 30. Henry Wallis and Eliz. Hodge.
 1697. Feb. 3. Anthony Wallis and Eliz. Avery.

BURIALS.

1611. Nov. ... Thomasyn Wallis.
 1652. Feb. 23. Richard, son of Richard Wallis; jun.
 1654. April 12. Mr. Richard Wallis, of Skonner.
 1701. Oct. 12. Henry Wallis, gent.
 1713. Oct. 30. Mr. John Wallis of Trethill.
 1737. July 16. Ferdinando Wallis, Esq.

A brass plate fixed on a black marble slab is inscribed to the memory of Alphonse Charles de Morel, ensign, 30th Regiment British Native Infantry, who fell in the battle of Chillianwallah, 13th January, 1849, aged 23. He was the eldest son of the Count de Morel and Charlotte Jemina, his wife, the eldest daughter of the Right Hon. Reginald Pole-Carew, of Antony House.

A mural tablet records that Mrs. Jane, wife of Mr. Hugh Littleton, of Intown in St. Germans, yeoman, and daughter of Hugh Littleton, of Lanjore, in the same parish, gent., died 16th May, 1773, aged 63; also Mary, Elizabeth, and Jane, daughters of the above. Mary died 25th January, 1740, aged 5 years; Elizabeth died 16th February, 1742, aged 9 years; and Jane died 20th November, 1757, aged 17 years. The above Mr. Hugh Littleton, of Intown, died 1st January, 1788, aged 78. There is a pedigree of Littleton in Col. Vivian's *Visitations of Cornwall*, but this line is not continued beyond Hugh Littleton, of St. Germans, baptised at Lanlivery 1st May, 1682.

Mr. Hugh Littleton and Mrs. Grace Littleton are recorded in these Registers as having been married at St. Germans 5th January, 1732. There must be a mistake in this entry of the name of Grace instead of Jane; the dates agree too closely for there being much doubt. The name does not occur again in the Registers until the close of the seventeenth century, and then there are not many entries.

BAPTISMS.

- 1699. March 6. Elizabeth, daughter of John Littleton and Dorothy.
- 1701. Sept. 13. John, son of John Littleton and Dorothy.
- 1702. March 20. John, son of John Littleton and Dorothy.
- 1705. Aug. 3. Philip, son of John Littleton and Dorothy.
- 1710. June 27. Hugh, son of John Littleton and Dorothy.
- 1712. March 25. Samuel, son of John Littleton and Dorothy.

WEDDINGS.

- 1698. May 16. John Littleton and Dorothy Bloye.
- 1738. Dec. 31. Samuel Littleton and Grace Martin.

BURIALS.

- 1702. Sept. 17. John, son of John Littleton.
- 1713. Feb. 13. Dorothy Littleton.
- 1716. Aug. 21. Elizabeth Littleton.
- 1735. April 20. John Littleton.

It only remains now to give the information on a slate slab to complete the histories on stone within this church; and it is brief, and simply tells us that William Dunrich, of Liscawn, in this parish, died 3rd February, 1794, aged 73; and that his wife Elizabeth died 26th February, 1802, aged 83.

In the yard among others are memorials to the following:

Captain John Pole, R.N., second son of the late Rev. Edward Pole, D.D., rector of Barford St. Martin's, county Wilts, and brother to the Rev. Reginald Pole, rector of this parish. He died 31st October, 1838, aged 38 years. Also Jane Pole, wife of the above Rev. Edward Pole, D.D., who died on the 8th March, 1854, aged 87. (The above Rev. Edward Pole, D.D., was the youngest son of Reginald Pole, Esq., grandson of Sir John Pole, of Shute. His elder brother, the Rev. Reginald Pole, took the name and arms of Carew, and was grandfather of the present W. H. Pole-Carew, Esq.)

Lieutenant George Wallis Glanville, Bengal army, killed at Cawnpore 27th June, 1857, aged 25 years, son of Francis Glanville, of Catchfrench, and Amabel his wife. Amabel, wife of Francis Glanville, Esq., of Catchfrench, died 12th April, 1871, aged 74 years.

Harriet Elizabeth, youngest child of Francis and Amabel Glanville, of Catchfrench, died 24th June, 1867. (The above Francis Glanville was the eldest son and heir of Francis Glanville, Esq., of Catchfrench, J.P., D.L., and M.P. for Plymouth from 1797 to 1802; by his second wife Elizabeth, second daughter of Robert Fanshawe, Esq., Commissioner of Plymouth Dockyard. He married Amabel, daughter of the Right Hon. Reginald Pole-Carew, and sister of the present W. H. Pole-Carew, Esq., of Antony House, by whom he had, with other children, the Rev. Henry Carew Glanville, M.A., the present rector of Sheviok.)

John Littleton, Esq., of Trewin, who died 24th February, 1869, aged 58.

Turning our attention to the Registers of the parish, we find that they exist from a much earlier period than many in this neighbourhood—indeed, we may say than most; but as they have formed the subject of a recent paper read before the Society of Antiquaries, which has been printed in their Proceedings,¹ we will only briefly refer to their condition here, and give a few extracts that appear interesting.

The earliest existing dates are Burials in 1569; Weddings 1571 (if we except two entries in 1570); but no Baptisms remain earlier than 1624. In many places half the pages are quite gone, the parchment having mouldered away, so that we must by

¹ *Pro. Soc. Ant.* London, second series, vol. x. p. 264.

no means think that because there are entries back to those dates the whole remains ; for until about 1640 only a very small portion is still legible, and in some parts many years are entirely wanting. Appended to the earlier portion of the Register, having been written at the end of the volume, are the following notices of collections made on briefs ; viz. :

Collected in this pish of Sheviock the 17th day of June 1655 by John Gey, minister, Richard Bray, & Symon Lavers, churchwardens, and William Jane, their assistant, the full sume of one pound tenn shillings & six pence for the poor protestants in Savoy according to a Declaration of his Highnesse the L^d Protector & his Counsell to that purpose : And the 21st day of the s^d month in the s^d yeere p^d over to the use afores^d according to Instructions to the Declaration afores^d annexed unto John Moyle Esq. then one of his Highnesse Justices of the peace for the county of Cornwall.

Collected in this pish of Sheviock the 28th day of November & the weeke following in the yeere of o^r Lord 1658 by Richard Rolle, minister, Richard Holman & Thomas Harry, churchwardens, Edward Truscot & Symon Lavers, overseers, the sume of eleven shillings & five pence, for the distressed Inhabitants of Piddletrenthead in Dorsetshire who sustayned great losse by fyre, according as wee were thereunto required by virtue of letters pattents under the great seale of England by his Highnesse speciall grace Oliver late Lord Protector : and payd over unto (rest blank).

Novemb^r 17th 1661.

Collected then for & towards the releife of the protestant churches in y^e Dukedom of Lithuania by virtue of Letters patents bearing date at Westminster 12th day of July in the XIII. yeere of his Majesties reigne, the sume of sixe shillings & sixe pence, by us

John Arundell
Robert Pope.

Following these is written a document settling the fees for burial, with the signatures of the principal inhabitants attached, which may be sufficiently uncommon to be worth giving verbatim :

Wee the Churchwardens, Overseers for the poore, Sidesmen, and others the Inhabitants of the pish. of Sheviock whose names are heerunder written doo for many reasons us heerunto moving, consent and agree, And alsoe heerby order ; That from and after the tenth day of February next for every p^{son} that shall bee buried in the pish. Chancell of the said Church there shall bee payd to the churchwardens then beeing of the s^d pish., to the use of the s^d church and toward the Repayration of the same the sume of tenne shillings. And for every p^{son} that shall bee buried in any pte of the body of y^e s^d church there shall be payd five shillings and eight pence. And for

every p'son that shall be buryed in the South Yeele & Below the North & South doores of the s^d church there shall bee payd five shillings to the p'sons & use aforesaid, by any and every p'son that shall soe desire it. And that the present and future churchwardens shall be chargeable and give Accompt to the s^d pish. for the said respective sumes accordingly.

Witnessse our hands the 28th day of January 1653.

Richard Markes, sen ^r	Thomas Smyth
John Wallis	Richard Arundell
Philip Blake	William Odyorne
Nicholas Smythe	Nicholas Carkeet, jun ^r
Hugh Hawken	John Odyorne
Richard Wallis, jun ^r	John Harry
William Dewstoe	the signe of
Thomas Harry	John × Rundell
The signe of	the signe of
Nicholas × Carkeet, sen ^r	John × Reed
the signe of	
Richard × Hocken	

A true copie of the original transcribed by me

Johannes Wallis	} Will: Jane
& Nich: Smyth	
Scriberosi in Anno	
prædicto 1653	
	Ædiles

The most singular entry in these Registers is what amounts to the enrollment of a marriage settlement. How it came to be entered among the Registers is a mystery; probably the clerk received payment, but it appears to be quite a unique case; viz.:

Robert Harrye and Annys Odyorne widowe, were married the 28th day of January 1612, and y^t day were p'sented by the said Robert unto the children of the said Annys ten sev'rall bills of debt for paym^t of money as was agreed of in consederation of the said marryage. The bills beare date the xxviith of January.

It would have been interesting if the amount of the bills had been added, which it may be presumed were one for each child. Unfortunately the Baptismal Registers, which should contain the names of the children of the "said Annys" are wanting, nor is her first marriage to be found. A Joan, Margery, Amos, and John Odyorne were baptized respectively in 1609, 1610, 1611, 1612, but from the loss of their registers it is impossible to say if they were her children.

There are several instances in this Register of the entry of a marriage that had taken place in another church; that of the

Rev. Samuel Deeble and Mr. Samuel Smyth have already been noticed. Thus :

1603. Jan. 31. Willyam Burges and Emblyn Kneebone were married at Lynkenhorne.
1659. Aug. 24. William Adyorne and Margaret Wilshman married in the pish. church of St Keyn the xxiii^d day of August in the yeere 1659, by George Phare minist^r of St Keyn afores^d as by a certificate under his hand hath beene certified to mee. W^m Jane.¹
1671. June 29. Robert Peter and Johan Arundell, "as I am informed at Plymouth by Licence."

The following are examples of the entries of civil marriages :

John Sargent & Margaret Tailder were married the viith day of September by John Radford then Maior of Saltash, as by his Certificate under his hand & Seale to mee hath beene certified, in the yeere 1654. Will: Jane, Registr.

Richard Bray the sonne of Emanuell Bray & Jone Reape the daughter of William Reape deceased both of this pish were married by Anthony Rouse Esq^{re} then Justice of y^e peace for the County of Cornwall the third day of Aprill in the yeere of our Lord one thousand sixe hundred fiftie seaven, as by his certificate under his hand & Seale bearinge date the day & yeere afores^d to mee hath beene certified. Will: Jane, Registr.

There only remain six such entries, but there is a gap between 1654, when such entries commence, and 1657, when they cease, and the marriages are said to be "by Mr. Richard Rolle, then minister of this pish."

The Register of Marriages appears to have been very badly kept from about 1644 to 1657. Thus the years 1645-48-50 have only one entry each, but there is not such a falling off in the Baptisms and Burials. Among the latter these are rather singular :

1650. June 26. John Lavers of Lantick in St Germans was buried here.
1650. July 9. John Rooby, who was drowned with the said John Lavers the xxth June last, was found brought hither and buried the ixth July.
1651. July 19. Robert son of Nicholas Williams of St Germans, who was drowned with his father at Wrickle Cliffe, was found, brought hither, and buried.
1654. Aug. 22. Anstis Ham, who lived fowerscore and odd yeeres and yet died a mayd to the great wonder of the world.

¹ In the banns which were published in this church the 7th, 14th, and 21st of the same month they are called 'both of this pish.'

The Baptisms contain little that calls for special notice. On 27th August, 1626, we find the entry of Thomas (?), son of John Harrys, a blind man, whose dwelling-place, he said, was Lanteglosse-by-Foye.

The following, either from a genealogical point, or for other reasons, appear sufficiently interesting to merit notice.

BAPTISMS.

1624. March 28. David, son of Mr. Gregory Arundell and Dorothy his wife.

This is the earliest existing baptismal entry in the Register. Mr. Gregory Arundell was rector of the parish. He appears in Col. Vivian's work (p. 13); but there his wife is called Edith, who was probably his second wife, and this Dorothy his first. It is most unfortunate that the Register is so imperfect, as there were probably other children who, with this David, are not mentioned in the pedigree above referred to; indeed, most of the Arundell entries here given are not to be found in the above work.

1655. Jan. 22. Ann, daughter of Mr. John Gey (late minister of this pish.) and Patience his wife, born 27th Dec. previous.
1656. April 7. Mary, daughter of Mr. Richard Rolle and Mary his wife, born 30th March previous.
1656. June 29. Gregory, son of Mr. John Arundell and Elizabeth his wife, born 17th of the same month.
1657. June 6. Richard, son of Walter Arundell and Jone his wife, born 27th May previous.
1657. June 22. Mary, daughter of Mr. Wm. Hawke and Mary his wife, born 27th May previous.
1658. April 14. Margaret, daughter of Mr. Richard Rolle and Mary his wife, born 15th March previous.
1664. July 1. Philip, son of Mr. John Blake and Grace his wife.
1664. Oct. 14. Elizabeth, daughter of Mr. Richard Rolle and Elizabeth his wife.
1664. Nov. 24. Amy, daughter of John Arundell, of Coate, and Ursula his wife.
1665. Jan. 10. Walter, son of Mr. Walter Arundell and Jone his wife, and buried 12th Jan. following.
1665. Mar. 21. Henry, son of Ferdinando Spiller and Margaret his wife.
1665. Mar. 21. Mary, daughter of Mr. John Blake and Grace his wife.
1668. May 22. John, son of John Arundell and Ursula his wife.
1668. Dec. 15. Jone, daughter of Mr. Richard Rolle and Jone his wife.

1671. Nov. 2. Elizabeth, daughter of Mr. Richard Rolle and Joan his wife.
 1679. June 10. George, son of Mr. Richard Rolle and Jone his wife, born 26th May previous.
 1684. April 12. Walter, son of Richard Arundell and Bridget his wife.
 1685. April 17. Jone, daughter of Richard Arundell and Bridget his wife.
 1686. Feb. 14. Amie, daughter of Richard Arundell and Bridget his wife.
 1687. July 28. Penelope, daughter of Mr. Nicholas Kendall and Jane his wife, bap. at Lanlivery.

This Mr. Nicholas Kendall took his M.A. degree, was ordained deacon in the Lady Chapel at Exeter 21st July, 1680, priest on the 30th, and instituted to the rectory of Sheviock on the 31st of the same month, thus bringing him to this parish, of which he rebuilt the rectory-house, over a mantelpiece in which the arms of Kendall still remain, though the house is no longer used for its original purpose.

The baptism of Penelope is recorded in the Register of Lanlivery, as are also those of Walter and Charles, with the statement that they were baptized at Sheviock. Walter was the eldest son, and became of Pelyn. He married, and was ancestor of the present Kendalls of Pelyn, &c. The second son, Charles, took holy orders, and attained the degree of D.D. He also married and left descendants.¹

Nicholas Kendall is buried at Lanlivery, where there is a mural monument to his memory. He is described as Nicholas Kendall, M.A., vicar of Lanlivery, rector of Sheviock, canon residentiary of the cathedral church of St. Peter, Exeter, and archdeacon of Totnes. Born 28th Jan., 1656, died 3rd March, 1739, and buried in the cathedral church of St. Peter, Exeter. He married first Jane, daughter of Thomas Carew of Harrobbear, Esq., by whom he had issue six sons and six daughters. He married secondly Hannah, daughter of John Snell of Exeter, Esq., who survived him. The inscription states that this monument was erected to his memory by his eldest son, Walter Kendall, Esq., of Pelyn. The monument is surmounted by the following shield of arms; viz., the dexter, *Arg. a chev. betw. three dolphins embowed sa.*; Kendall: the sinister, *Per fesse, in chief or, three lions pass. sa.*;

¹ See *Visitations of Cornwall*, p. 260; but most of the entries from these Registers are not given there.

Carew: in base, *Quarterly gu. and az., a cross flory, or*; Snell. A ledger-stone on the floor has the arms of Kendall imp. Carew finely cut and preserved, being, as the inscription tells us, for Jane, wife of the above Nicholas Kendall, of Pelyn, clerk, born 1st Nov., 1664, married 14th Oct., 1686, and buried 4th Sept., 1717. Another mural tablet commemorates the above-named Penelope, which gives the date of her birth as the 23rd July, 1687, and her marriage 9th March, 1702, to Mr. James Yonge, of Plymouth; but she died young, having been buried 28th June, 1708. According to these dates, she could not have been sixteen years of age at her marriage. But they cannot be far wrong; for in the Register of St. Andrew, Plymouth, is the burial, 12th Jan., 1705, of Penelope, daughter of Mr. James Young; while the second marriage of this James Yonge (as more correctly spelt on the monument in question), with Mrs. Mary Upton, is entered in the last-named Register as taking place 28th Sept., 1716.

It will be found that this account, beside giving some additional dates, &c., differs somewhat as to the benefices held by Nicholas Kendall. His institution to the Rectory of Sheviok is given on the authority of the original book of declarations on Institution signed by the Rector himself. Having given this explanation, it will be unnecessary to make any observation on the baptisms or burials of the other children of Nicholas Kendall, which will follow:

- | | | | |
|-------|-------|-----|----------------------------------------------------------------------------------|
| 1687. | Mar. | 20. | Gilbert, son of Mr. Samuel Beere and Elizabeth. |
| 1689. | April | 2. | Hawkyn, son of Mr. Samuel Beere, gent., and Elizabeth. |
| 1689. | Aug. | 12. | Walter, son of Mr. Nicholas Kendall and Jane, born 12th July. |
| 1689. | Sep. | 7. | Richard, son of Richard Arundell and Bridgett. |
| 1690. | Feb. | 22. | Samuel, son of Samuel Beere, gent., and Elizabeth. |
| 1690. | Mar. | 21. | Charles, son of Mr. Nicholas Kendall and Jane, born 26th February. |
| 1691. | Feb. | 2. | John, son of Philip Blake, gent., and Mary his wife, of the parish of St. Erney. |
| 1692. | July | 26. | Bridget, daughter of Richard Arundell and Bridget. |
| 1693. | May | 30. | Jane, daughter of Mr. Nicholas Kendall and Jane, born 20th May. |
| 1693. | Feb. | 14. | Gregory, son of Richard Arundell and Bridget. |
| 1693. | Feb. | 14. | John, son of Richard Arundell and Bridget. |
| 1695. | June | 1. | James, son of Mr. Nicholas Kendall and Jane, born 31st May. |
| 1695. | July | 25. | Gregory, son of Richard Arundell and Joan. |

1696. Sept. 8. Mary, daughter of Mr. Nicholas Kendall and Jane,
born 13th August.
1700. Sept. 5. Mary, daughter of Richard Arundell and Joan.
1701. April 8. Mary, daughter of John Arundell and Mary.
1702. Aug. 2. Elizabeth, daughter of John Arundell and Mary.
1704. June 26. Elizabeth, daughter of John Arundell and Mary.
1707. Nov. 5. Elizabeth, daughter of Mr. John Neele and Johanna
his wife, at Plymouth.
1707. Nov. 25. Margery, daughter of John Martin and Mary his
wife. To this is appended the note that
"Gregory Arundell is near the same age."
1711. May 15. John, son of John Neale, gent., and Joanna his
wife, born April 14th.

WEDDINGS.

1599. Sept. 16. William Bond, Esq., and Mary, daughter of Fer-
dinando Spyller.

This was probably the William Bond of Earth, whose wife Margaret, daughter and co-heir of Hugh Fountayne of Ugborough, was buried at St. Stephen's-by-Saltash, 10th October, 1597, he himself being buried there 15th September, 1623.

1599. Oct. 22. Christopher Skelton and Jane Buller.
1604. Oct. 29. William Spyller and Elizabeth Grylles.
1604. Oct. 30. Edward Grylles and Elizabeth Spyller.
1608. Aug. 30. Thomas Peake, citizen of London, and Tibitha
Arundell.
1616. Feb. 5. Arthur Peter and Elizabeth Arundell.
1624. Nov. 22. Philip Blake and Sibley Pope.
1627. Feb. 4. Manides Govett and Jone Edgecombe.
1633. Aug. 26. Trehane Scawen, gent., and Dorothe, daughter of
Mr. Gregory Arundell.
1646. May 25. Humphery Roberts and Frances Ellis of Plymouth.
1649. Sep. 27. Ferdinando Poplestone and Tibitha Smyth. As I
am informed (*sic*).
1650. Dec. 31. Mr. Francis Reynolds and Mrs. Mary Arundell.
1651. April 6. Mr. George Browne of Exeter and Mary Peter.
1653. June 30. John Arundell and Amye Hichins.
1659. William Andrew of St. Budeaux, in Devon, and
Mary Truscott of this pish. Published 27th
March, 3rd and 10th April, 1659.
1659. July 14. Nicholas Lukey of Eglosheale and Susanna Blake
of this pish.
1661. April 16. John Arundell of Coate and Ann Skelton.
1662. April 24. John Arundell of Coate and Ursula Hocken.
1662. April 28. Edward Bunce and Susan Finch, both of the pish.
of St. Germans.

1663. July 24. Richard Trowte of Tavistock, county Devon, gent., and Jane Lukyes, vid., servant to Mr. John Wallis of this pish. By Licence.
1663. Aug. 6. Thomas Osmanton of Littlehosteed, county Sussex, clerke, and Emlyn Rolle of this pish. By Licence.
1663. Oct. 15. Mr. Richard Rolle, Rector, and Elizabeth Smyth. (See full entry under Smyth extracts.)
1665. May 11. Mr. Christopher Leach of St. Winnow, clerk, and Mrs. Mary Lonn, widow. By Licence.
1666. Sept. 19. Richard Scrawen, gent. of the pish. of Probus, and Mary Bond, daughter of William Bond, Esq., of the pish. of St. Stephens, neere Saltash, deceased. By Licence.

She was baptised at St. Stephens, 5th July, 1635, and is named in the Bond pedigree (*Visitation Cornwall*, p. 41), but not her marriage.

1668. July 27. Mr. Richard Rolle, Rector of Sheviock, and Jone, daughter of William Jane. By Licence.
1670. Mar. 31. Gregory Martin of Plymouth Apothecary and Catherine Edgecumbe of this pish., spinster. By Licence.
1673. Mar. 6. Mr. Richard Rolle, Rector of Sheviock, and Mrs. Jone Hitchins. By Licence.

This Jone Hitchins was undoubtedly Jone, daughter of William Hichins of Sheviock, who by his will, proved 8th April, 1635, left the barton of Sheviock to his son John Hichins, then under age. His marriage with Mary Coa— is entered 8th October, 1619. Unfortunately a portion of the parchment here is quite decayed away, thus destroying part of the surname of the wife. From the same cause most of the entries relating to this William Hichins are gone.

1679. Jan. 1. John Warren and Sibella Arundell.
1683. June 19. Richard Arundell and Bridget Balson.
1686. March 12. Samuel Beere and Elizabeth Hawkn.
1694. June 2. Richard Arundell and Jone Hawke.
1695. Jan. 16. Henry Austen and Amy Arundell.
1700. Feb. 5. John Arundell and Mary Cole, widow.
1704. Dec. 29. Mr. Peter Osborn and Mrs. Anne Chapman, of Liskeard.
1708. John Harvy and Amy Arundell.
1721. Nov. 14. John Short and Mary Arundell.
1722. Dec. 26. Samuel Spiller and Joan Arundell.
1729. April 8. Mr. Samuel Trewbody, Minister of St. Germans, and Mrs. Elizabeth Hancock, of Hendra, widow, by Licence.

1737. Nov. 27. Richard Hobbs, of St. Germans, and Mary Glanville, of Sheviock.
 1739. Aug. 1. Mr. Robert Snook and Mrs. Sarah Pomery.
 1742. Oct. 24. Mr. Cornelius George and Mrs. Elizabeth Bennet, by Licence.
 1744. Oct. 22. Mr. John Jesop and Mrs. Elizabeth Foot, by Licence.
 1746. May 23. Mr. Thomas Edwards and Mrs. Thomasine Little, by Licence.

BURIALS.

1583. June 14. Katherine, daughter of Ferdinando Spiller.
 1589. Aug. 10. John the Sr giant of Southyas (*sic.*).
 1652. Aug. 13. Mr. Arthur Peter.
 1652. June 26. Elizabeth, daughter of Walter Arundell.
 1652. March 9. Philip, son of Walter Arundell.
 1653. March 11. Richard, son of Mr. Richard Arundell.
 1654. Aug. 10. Mr. Toby Langdon.
 1654. Feb. 4. Mr. Gregory Arundell, Minister of this Pish.
 1674. Jan. 29. Mrs. Elizabeth Peter.
 1675. Oct. 20. Johanna, Chara Mea filia, Richard Rolle, Rector of Sheviock, Sepul. Duo decimo ætat 35.
 1676. Sept. 9. Mrs. Katherine Arundell, widow.
 1676. Feb. 2. Mr. John Blake.
 1679. March 2. Mrs. Margaret Bond, spinster.
 1681. Nov. 19. Anthony Bond, gent.
 1683. April 24. Mrs. Joan Rolle, widow.
 1689. Dec. 29. Mr. Philip Blake, aged 89.
 1690. March 28. Walter Arundell.
 1690. March 31. Samuel Beere.
 1692. Aug. 6. Sir John Carew, Bart., died 1st August.
 1693. Jan. 18. Jane, daughter of Mr. Nicholas Kendall.
 1693. Feb. 15. Bridgett Arundell.
 1693. Feb. 16. John, son of Richard Arundell.
 1694. Oct. 28. Ursula Arundell.
 1694. Nov. 18. John Arundell.
 1694. March 24. Gregory Arundell.
 1695. June 3. James, son of Mr. Nicholas Arundell.
 1695. Oct. 2. Gregory Arundell.
 1695. Oct. 8. Nicholas Arundell.
 1695. Nov. 1. Hugh Hawkyn, gent.
 1696. Nov. 23. Mary, daughter of Mr. Nicholas Kendall.
 1700. March 3. Richard Arundell.
 1701. April 9. Mary, daughter of John Arundell.
 1702. Feb. 4. Elizabeth Arundell.
 1703. Oct. 18. Sir Richard Carew, Bart., died 24th September, buried at Anthony.
 1704. March 31. Jone Arundell, junr.
 1704. July 17. Bridgett Arundell.
 1705. July 3. Mrs. Elizabeth Blake.

- 1706. Aug. 26. Walter Arundell.
- 1707. Aug. 18. John Arundell.
- 1708. March 30. Richard Arundell.
- 1710. July 2. Mr. Ferdinando Spiller.
- 1710. Sept. 15. Mrs. Grace Blake, widow.
- 1711. Jan. 27. Mr. Thomas Blake.
- 1713. Aug. 11. John Neele, gent.
- 1715. March 23. Mary Arundell.
- 1717. May 20. Samuel Beere, gent.
- 1717. Mrs Kendall, died 3rd September.

(This was Jane, the first wife of Nicholas Kendall. She was buried with a monument at Lanlivery, as already mentioned.)

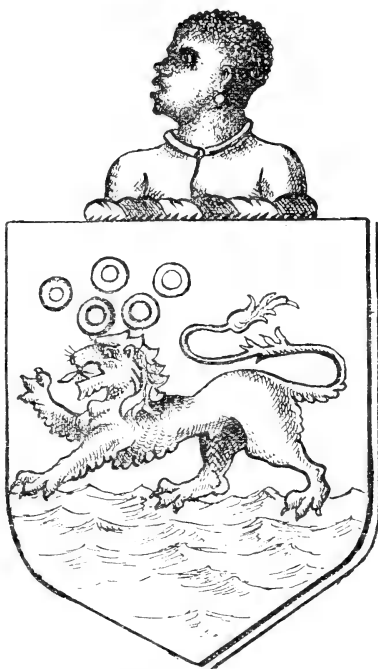
- 1718. June 10. Mrs. Margaret Spiller.
- 1719. April 19. Mrs. Phillis Langdon.
- 1720. June 21. Anthony Blake, gent., aged 88 years.
- 1723. April 22. Roger Langdon, gent. A riding officer or waiter.
- 1724. Dec. 13. Mrs. Mary Blake, aged 92 years.
- 1729. March 7. Mr. Robert Avery, clerk, of St. Germans.
- 1730. Dec. 27. Joan Arundell, widow.
- 1732. Oct. 19. Mr. James Kendall, clerk.
- 1732. March 6. Mr. John Jenkyn, clerk.
- 1733. April 11. Mr. Short, of St. Germans.
- 1734. Gilbert Beere, gent.
- 1736. June 8. Mrs. Elizabeth Beere.
- 1736. Aug. 14. Mrs. Hawkins Beere.
- 1736. Sept. 10. Elizabeth Arundell.
- 1739. April 4. Gregory Arundell.

It will be perhaps a surprise to many persons to be informed that the ancient fabric which is very generally supposed to be the parish church of Saltash has not been such until **Saltash.** within the last few years, being in fact only a private chapel within the parish of St. Stephens-by-Saltash, and supplied by a chaplain whose jurisdiction was limited by the walls of his "chapel." Strange as it may appear, the borough town of Saltash, with its Mayor and Corporation, its Members of Parliament, and its extended jurisdiction of the silver oar, was only a portion of the rural parish of St. Stephens, to whose church, a mile distant, its inhabitants had to resort for such offices of the church as baptism, marriage, and burial.

The chapel, which is dedicated to St. Nicholas, was originally a cell belonging to the Priory of St. Germans, and its services were performed by the monks of that house. In the latter part of the fifteenth century, one of the Smyths of Tregonnick left a bequest to the chaplain of St. Nicholas Chapel, Saltash, to perform masses,

and assist in the services of the said chapel, which latter clause saved the bequest from confiscation on the suppression of religious houses by King Henry VIII., while the fabric of the chapel was handed over to the Corporation, the priest of St. Nicholas acting as their chaplain. As the private chapel of a municipal corporation, one would expect to find the sacred building filled with memorials of deceased mayors and worthy aldermen; but such is not the case—the monuments are few and modern. There is a mural monument in memory of Gertrude Hawkins, wife of Captain Edward Hawkins, R.N., who died 21st June, 1823, and her husband, who died 30th

April, 1829. The arms on this monument are, *Sa. on waves of the sea in base vert, a lion pass. arg., the tail couard, over the lion's head five annulets of the third.* Crest, *A moor's head coupé below the shoulders sa., vested arg., side face.* These arms are a variation of the coat borne by Sir John Hawkins. Another tablet commemorates Edward Hawkins, who died in January, 1813, aged 93 years; Mary his wife, who died in May 1814, aged 72 years; and their daughter, Anne, who died in December, 1777, aged 4 years and 6 months. A third tablet re-



records another member of this family, Elizabeth Hawkins, widow of Edward Hawkins, Captain R.N., who died 4th January, 1864. An inscription within an arched canopy in the wall forming an altar tomb records the death, on the 9th October, 1839, and in the 42nd year of her age, of Anna Eliza, wife of the Rev. William Hawkins, LL.B., together with their daughters, Jane, born 9th and died 13th October, 1839, and Emily Caroline, who died 8th October, 1841, aged 5 years. In the Register are a few entries relating to this family.

A neat tablet with *bas-relief*, supposed to represent the scenes of the disaster, is in memory of John and James Drew, Captains R.N., also James William Drew, Acting-Lieutenant, the first and third drowned crossing Cawsand Bay 11th January, 1798, the second shipwrecked and drowned the 25th May following; the tablet being erected, as the inscription records, by their surviving relatives.

Commemorating some connections of the same family stands a tablet telling us that Louisa Barlow, wife of William Barlow, of Plymouth Dock, gent., and daughter of Stephen Drew, Esq^{re}, Alderman of Saltash, departed this mortal life 19th July, 1795, at the early age of 25 years and 9 months. Stephen Drew Barlow, their son, died October, 1793, aged only 18 weeks, and was followed to the grave by an infant sister aged 19 months, Louisa Drew Barlow, who died 30th June, 1796.

A mural tablet informs us that John Evans, Esq., Purser, R.N., Secretary to Admiral the Hon. William Cornwallis, and twice Mayor of Saltash, died 3rd July, 1834, aged 71. It also commemorates Jane, his first wife, who died 28th October, 1808, aged 37 years; and Mary Ziegel, his second wife, who survived him only a few months, dying 22nd January, 1835, aged 53 years. The same marble records the death of John Henry Evans, Esq., M.D., son of the above John and Mary Ziegel Evans, who departed this life 21st October, 1855, aged 23. The memorial was erected by the surviving son and four daughters of John Evans.

Upon the walls we find three monumental tablets to members of the family of Hore. The earliest of these is for Charity, wife of Nicholas Hore, of Saltash, who died 29th December, 1791, aged 65. Her husband followed her to the grave in 1800. "Putting off this mortal coil on the 25th May, after having borne the joys and sorrows of seventy-two years of life; leaving six children surviving him." The second of these tablets is in memory of Sally Ball Graham, born 11th June, 1817, and died 30th April, 1818; and also James Hore Graham, born 22nd August, 1815, dying 29th May, 1818, children of Major John Hore Graham, R.M., and Rachael Collier, his wife. The remaining stone records the facts that Mathew Hore, Esq., of this parish, Commander of H.M. Revenue cutter, died 23rd November, 1826, aged 61. It is also in memory of his second son, Mathew Hore, who was lost in a shipwreck 23rd July, 1821.

Another stone records the death of a civic dignitary, John Cook, Esq., mayor of Saltash for nine successive years, who died 25th July, 1873, at the good old age of 85 years.

Two of the windows in the church are memorial. One has the arms of Littleton—a family already mentioned under Sheviock Church; viz., *Quarterly 1 and 4 Arg. a chev. sa. betw. three escallop shells sa.*; Littleton: *2 & 3 Or three piles in point sa., a canton erm.*; Wrottesley: *on the centre a crescent or, for the difference of the second line.* Crest, *A stag's face ppr. charged with a crescent sa. for difference, betw. the horns a hunting horn of the last.* Motto, *Ung dieu et ung Roy.* Beneath this the date 1869. The motto is an exposition of the Scriptural doctrine, "No man can serve two masters," wherein it is shown you must serve but one God and King, which together are one Master; for to serve the under lord must involve the service of the over lord—at least it is so in theory. A brass beneath this window is inscribed to the memory of Nicholas Henry Littleton, M.B., born 1st January, 1823, died 23rd November, 1848.

The other memorial window commemorates Robert Nepean Duins, Esq., of Bombay, and Rose Anne Brady, his wife, and was erected by his brothers and sisters in 1865.

The only remaining memorial is a floor slab in an out-of-the-way corner, though it is the oldest and most interesting memorial in the church. It commemorates Edward Webb, an alderman of this corporation, who died 8th October, 1750, aged 48. On it are cut his arms; viz., *A cross with a double-headed eagle displayed in the second quarter.* Crest, *An ass's head coupéd.* The arms are not quite correct. The eagle should have only one head, and be placed in the first quarter. The family were descended from Webb, of Exeter, who entered their arms and pedigree at the Heralds' Visitation of Devon in 1620. The arms so entered were, *Or a cross sa., in the first quarter an eagle displayed of the second.* Crest, *A hind's head coupéd ppr.* The burial of this Edward Webb is not entered in the register, though that of his wife, Mrs. Philippa Webb, is recorded as taking place on the 22nd January, 1768. Also the baptism, the 23rd March, 1744, of Arthur Kelley, son of Edward and Philippa, privately, and confirmed in the chapel on 29th May, 1745. Several entries of others of the name of Webb occur, but there appears no connection between them.

We will now turn to the Registers themselves, the entries in which, from the cause already stated—St. Nicholas being a non-parochial chapel within the parish of St. Stephen—are very few.

One thin folio volume of parchment contains the whole of the entries down to the commencement of the present century. The baptisms begin in 1697, and there are entries down to 1815; such of them as appear of sufficient interest are appended. The whole of the weddings are given below, being limited to the small number of seven, and one of these is stated to have been at St. Stephens. The burials extend from 1752 to 1815, and consist of sixty-one entries, being just an average of one each year. From their small number, and most of the names being of more or less general interest, it appears worth giving the Register of burials entire.

Beside the Registers proper the following memoranda are entered :

1752. July 7. The worshipful Dr. Lee, Judge of the Arches Court of Canterbury, gave sentence in a cause of appeal between Stephen Hams, vicar of St. Stephens, and John Lyne, curate or chaplain of Saltash. In which sentence the Judge decreed for the appellant J. Lyne, revoked a former decree of nullity given by the Judge in the Court of Exeter, and confirmed the said John Lyne's license to y^e chapel of Saltash, heretofore obtained by him from the Bishop of Exeter, in pursuance of a nomination from the Mayor and free Burgesses of the said Borough of Saltash.

J. Lyne, Chaplain.

John Greet served the Borough of Saltash chape as clerk for William Letheby, from April 26, 1741, to June 27, 1741, and then William Letheby died, and so he was settled clerk by the consent of Mr. Sweetnam then Mayor, and the rest of the aldermen. Written for memorandum the 17th Jan., 1742-3, by

John Greet, Clerk.

William Strathon served the Borough of Saltash as Deputy Clerk for John Greet three years, and then established by the Revd. William Trevanion Barlow, Mayor, and the Aldermen, and Burgesses of the Bench in Court 1791.

William Strathon, Clerk of the chape of Saltash.

Memd. Jan. 24, 1803. At a meeting of the Mayor, Aldermen, and Free Burgesses, held this day at the Town Hall, the Revd. Charles Mathew was unanimously elected chaplain, in the room of the late Revd. William Trevanion Barlow.

Received of Mr. Tucker four Briefs.

			£	s.	d.
1765.	June 2.	Collingbarn and Abbotsbury, Fires			
		in com. Wilts and Dorset	0	1	6½
1765.	Aug. 28.	Lysham Church, in com. Lanc.	0	1	0½
1765.	(?) 12.	Run (?) Church, in com. Stafford	0	1	4½
1765.		Hailstorm in com. Kent	0	7	2½

At the end of the burials is the following record :

It appears by the Book kept by W^m Strathon clerk of the chapel of this Borough & now shown to me that Thomas Carew Surgeon was buried in the said chapel the 26th of January 1797, the entry of which Burial in this Register Book was omitted at that time & Therefore is made from the clerk's Book as on the other side, the said clerk having made oath that He was present at the Burial of the said Thomas Carew.

C. Mathew, chaplain.

BAPTISMS.

- | | | | |
|-------|-------|-----|----------------------------------------------------------------------------------------------|
| 1694. | Dec. | 4. | Agnes, daughter of Mr. John Moulton. |
| 1701. | Jan. | 4. | Thomas, son of Thomas Wills and Sybella his wife. |
| 1711. | June | 27. | Jane, daughter of Captain John Tucker and Margaret his wife. |
| 1713. | Nov. | 13. | Sarah, daughter of Captain John Tucker and Margaret his wife. |
| 1715. | Nov. | 15. | Lydston, son of Captain John Tucker and Margaret his wife. |
| 1717. | Mar. | 30. | John, son of Captain John Tucker and Margaret his wife. |
| 1717. | Feb. | 7. | Margareta Maria, daughter of Mr. John Hicks and Elizabeth his wife. |
| 1722. | Aug. | 31. | Elizabeth, daughter of John Hicks, gent., and Elizabeth his wife. |
| 1723. | Nov. | 11. | Isabella, daughter of Robert Millett and Isabella his wife. |
| 1724. | April | 19. | Thomasine, daughter of Robert Millett and Isabella his wife. |
| 1728. | Feb. | 20. | John Moolton, son of Mr. Henry and Ann Carew. |
| 1729. | Sept. | 1. | John, son of Mr. John and Mrs. Elizabeth Hicks. |
| 1730. | Sept. | 17. | Grace, daughter Mr. Henry and Mrs. Ann Carew. |
| 1730. | Oct. | 15. | William, son of Mr. John and Mrs. Elizabeth Hicks. |
| 1731. | Aug. | 30. | Robert, son of William Hancock and Mary his wife, born 8th August. (This entry is in Latin.) |
| 1732. | May | 22. | Loveday and Jone, daughters of Mr. John and Mrs. Elizabeth Hikes. |
| 1732. | Sept. | 16. | Ann, daughter of the Rev. Mr. Henry Carew and Ann his wife. |
| 1736. | May | 3. | John, son of Edmund and Ann Herring. |
| 1737. | Feb. | 16. | Ann, daughter of Edmund and Ann Herring. |
| 1742. | Jan. | 21. | Margaret Whiting, daughter of John and Mary Beele. |
| 1743. | Dec. | 26. | Thomas Pollard, son of Mr. Henry and Dorothy Lean. |
| 1752. | Aug. | 25. | Evan, son of Nicholas and Margaret Nepean. |

(There are a good many entries of members of this family. The Evan here mentioned, further particulars of whom will be found in the baronetage, was created a baronet 10th June, 1802).

1753. June 3. Solomon Tash, a Black Boy of Mr. Trehearns.
 1753. June 27. John Pomeroy, son of Mr. John James and Loveday his wife ; privately, and confirmed Sept. 9.
 1755. Jan. 9. William, son of Mr. John James and Loveday his wife ; privately, and confirmed March 19.
 1756. June 6. Sarah Sparke, daughter of the Rev. John Hutchins and Sarah his wife ; privately, and publicly ratified in Townstall Church, in Dartmouth Hardness, on 7th August, 1757.
 1756. April 15. Thomas, son of John James and Loveday his wife ; privately, and confirmed 21st September, 1757.
 1757. June 15. Loveday, daughter of John James and Loveday ; privately, and ratified September 21.
 1757. Nov. 10. Catherine Browse, daughter of the Rev. John Hutchins and Sarah his wife.
 1759. Dec. 18. Edmond, son of Richard and Eleanor Herring.
 1761. Jan. 8. Robert Lidstone, son of John and Loveday James.
 1765. Aug. 16. Harriott, daughter of the Rev. Thomas Neale, Chaplain, and Susanna his wife, born July 2.
 1765. Dec. 29. Dorothy Hicks, daughter of John and Loveday James.
 1767. Aug. 4. Thomas, son of the Rev. Thomas Neale and Susanna his wife, born June 26.
 1767. Aug. 9. Mary Arundell, daughter of John and Loveday James.
 1769. May 21. Pendock, son of the Rev. Thomas Neale and Susanna his wife, born May 8.
 1788. Mar. 11. Ann, daughter of Edmond and Sarah Herring.
 1789. Aug. 22. Joseph, son of William and Ann Worth.
 1789. Nov. 18. Edmond, son of Edmond and Sarah Herring.
 1790. Dec. 23. Mary Trehane, daughter of Edmond and Sarah Herring.
 1793. April 15. Edmond, son of Edmond and Sarah Herring.
 1812. Aug. 2. John Henry, son of John and Mary Ziegel Evans, born 7th July.
 1815. Jan. 6. Jane Elizabeth Porthouse, daughter of the Rev. Isaac Dawson, Chaplain of this borough, son of Thomas and Dinah Dawson of Troutbeck, near Kendal, in Westmoreland, by Elizabeth his wife, daughter of Michael and Jane Appleby of Bishop's Auckland, co. Durham, born 30th August, 1814.

WEDDINGS.

1721. July 24. George Yeo, gent., and Gertrude Rogers. By Licence.
 1739. June 25. Joel Pope and Elizabeth Stephens, widow.
 1740. April 11. John Arundell and Honnor Wills. By Licence.
 1740. Mar. 21. John Wadge and Susannah Mounk.
 1740. Mar. 29. John Thomson and Mary George.

- 1748-9. Jan. 5. The Rev. John Lyne and Amy Swetnam, widow of Nathaniel Swetnam, late carpenter of His Majesties' ship *Saltash*, and daughter of Mr. John and Mrs. Amy Tucker of Crediton.
1755. July 29. The Rev. John Hutchins and Sarah Sparke of Dartmouth, daughter of Henry Sparke of Dartmouth, merchant, married at St. Stephen's Church, as appears by the Register.

BURIALS.

1753. Feb. 13. Elizabeth, wife of Mr. John Hickes.
1753. May 29. John, son of the Rev. Mr. Edmond Herring.
1755. April 11. Mary, wife of Mr. Robert Hickes.
1755. May 18. Mathew Hore.
1756. Feb. 23. Catherine, daughter of Jacob Thomas and Catherine his wife.
1756. June 8. Elizabeth, daughter of Robert Hickes and Mary his wife.
1756. Nov. 20. Mr. John Hickes. In Linnen.
1758. Sept. 9. Mrs. Joan Williams.
1758. Dec. 1. Catherine Browse, daughter of the Rev. John Hutchins and Sarah his wife.
1760. Jan. 21. Mrs. Agnes Milles.
1760. Dec. 7. Nicholas Webb.
1766. May 11. Elizabeth Tucker, wife of William Tucker. (This entry is first made with the Christian name of the wife blank, the next line has the entry repeated with the Christian name supplied.)
1766. May 18. Mary, daughter of William Tucker.
1766. June 2. Loveday, daughter of John and Loveday James.
1768. Jan. 22. Mrs. Philippa Webb.
1768. Mar. 9. Mrs. Damaris Sweetnam, wife of Mr. Joseph Sweetnam.
1769. Jan. 25. Elizabeth, wife of James Little.
1769. July 12. John, son of John and Loveday James.
1769. Aug. 24. Mr. Joseph Sweetnam.
1769. Dec. 31. Mrs. Elizabeth Carwarn.
1771. June 14. Mr. Thomas Chaffe.
1771. Oct. 1. Mr. Richard Herring.
1775. Oct. 18. Mr. Samuel Hunn.
1775. Oct. 31. John Hill, Esq.
1776. April 21. Margaret Brenton.
1777. Dec. 10. Ann, daughter of Edward and Mary Hawkins.
1779. Oct. 15. Martha Jenner.
1780. June 9. Elizabeth Webb.
1780. July 4. Dorothy Webb.
1781. Oct. 3. Ann, daughter of Richard and Eleanor Herring.
1782. Dec. 29. John Jenner, Esq., Alderman of this Corporation.
1784. Jan. 11. Mary Webb.
1784. May 30. Thomas Graham.

1785.	Sept.	10.	John Taylor. Tax paid.
1792.	Jan.	4.	Charity Hore.
1793.	Nov.	19.	Stephen Drew, son of William and Louisa Barlow.
1794.	Mar.	5.	Nicholas Nepean, Alderman of this Borough.
1794.	April	24.	Jane, wife of Robert Hickes, Alderman of this Borough.
1795.	July	21.	Louisa Barlow, wife of William Barlow, of Plymouth Dock, gent.
1796.	June	2.	Louisa Drew, daughter of William and Louisa Barlow.
1797.	Jan.	26.	Thomas Carew.
1797.	April	12.	Eleanor Herring.
1797.	Aug.	31.	Jane Mallet.
1797.	Sept.	29.	Sarah Collier.
1800.	Feb.	14.	William Herring.
1800.	May	29.	Michael Hore.
1801.	Feb.	6.	Mary Barlow.
1802.	May	25.	William Trevanion Barlow.
1802.	June	20.	Mary Breton.
1802.	Dec.	29.	Mary Drew.
1803.	Dec.	6.	Elizabeth Westcott.
1803.	Dec.	30.	Samuel Westcott.
1804.	Oct.	20.	John Drew, Lieutenant, R. N.
1805.	June	1.	Thomas Drew.
1806.	Feb.	5.	George Hanbury Williams Barlow.
1806.	Mar.	5.	Christopher Herring.
1808.	Dec.	10.	Elizabeth Spicer, wife of Col. William Spicer, R. A., and daughter of Mr. Hickes, Alderman of this Borough.
1809.	Feb.	1.	Robert Hickes, Alderman of the Borough of Saltash.
1815.	April	5.	Philip Perry, Surgeon, of the Borough of Saltash.

The foregoing include the whole of the entries of Weddings and Burials in the first volume, which extends down to the year 1815.

SANITARY SCIENCE.

SYLLABUS OF A THIRD PAPER BY A. R. DEBNAM.

(Read 17th December, 1885.)

VENTILATION. Air space in dwellings. Overcrowding. Ventilation of small dwellings and public buildings. Inlets and outlets. Different systems of ventilation in use.

CONVERSAZIONE.

(7th January, 1886.)

FOR an account of this, see the Report of the Secretaries.

FEDERATION.

(14th January, 1886.)

THIS evening Professor Chapman opened a discussion upon Federation, in which several members and friends took part.

SOME FACTS AND THEORIES CONCERNING HERALDRY.

SYLLABUS OF PAPER BY W. C. WADE.

(Read 28th January, 1886.)

MODERN views on heraldry. Custom of France and the United States. Heraldry accepted by democracies as well as aristocracies. Contention that arms were originally adopted with a symbolic object. The contention of Mr. Planché to the contrary examined. Canting arms. Sir Walter Scott's theory as to heraldry, as expressed in his writings. Origin of systematic heraldry. Welsh legendary arms. Examples of ancient arms containing symbolic figures. Fabulous beasts of heraldry. Symbolical colours. Beasts of the chase. Arms of feudal alliance. Some Devonshire and Cornish arms. Augmentations. Arms of the United States; of Plymouth; of Drake. Conclusion.

NOTES ON EDUCATION.

SYLLABUS OF PAPER BY REV. W. DICKSON, LL.D.

(Read 4th February, 1886.)

OBJECT and aims of Education in (1) Discipline ; (2) Instruction ; (3) Use of reasoning powers ; (4) In using leisure time ; (5) In formation of character. Grounds of conduct, wide divergence, leading to the religious difficulty. Various solutions thereof. Attitude of the State as to education. Various courses open. Free education : what it really is. Opinions of eminent men. Summary of arguments for and against free education.

SHAKESPEARE'S HAMLET.

SYLLABUS OF LECTURE BY W. J. SQUARE, F.R.C.S.

(Read 11th February, 1886.)

INTRODUCTION. The ghost scene. Hamlet's oath to avenge his father's murder. His reflections on suicide, death, and immortality. His soliloquies. His assumed lunacy. His character--noble, intellectual, moral, but weak in action. His irresolution and procrastination. His failure to accomplish his sworn act of vengeance. Observations on the character of Polonius, Ophelia, and other personages in the drama. Final scene of death and desolation. General remarks on the drama and on Shakespeare himself.

THE ORDNANCE SURVEY OF GREAT BRITAIN AND IRELAND.

SYLLABUS OF LECTURE BY CAPT. R. THOMPSON, R.E.

(Read 18th February, 1886.)

HISTORY of the Survey. Present organization and members of staff. Annual expense. Nature of information supplied on the plans. Public advantages derived from their issue. Reasons for the selection of the various scales. Outline of the various processes necessary from commencement to completion. Present state of progress. Anticipated date of completion. Average cost per acre of some of the processes.

THE ANTIQUITIES OF CORNWALL.

SYLLABUS OF LECTURE BY REV. W. IAGO, B.A., F.S.A.,
President of the Royal Institution of Cornwall.

(Read 25th February, 1886.)

ANCIENT animal remains. Traces of early inhabitants (native tribes and their invaders). Burial places, hut dwellings, fogōus, crannoges, fortifications, theatres, roads, mines, coins, pottery, weapons, tools, ornaments, stone monuments, language, traditions, inscriptions. Cremation and various modes of burial. Early Christian teachers, crosses, manumissions of slaves. Ancient and mediæval government, manuscripts, armorial bearings, slabs, brasses. Ecclesiastical, civil, and military buildings, &c.

In treating of the above the following (*inter alia*) were included: Enquiry into the origin of phenomenal piles of rock, logan-stones, rock-basins, &c. The Giant's Hedge, barrows, men-hirs, cromlechs, circles. Phœnician, Greek, British, and Roman remains. Celtic evidences. Urns, spindle-whorls, snake rings, gold torques. The Druids, the Hebrew image. Implements of horn, wood, stone, bronze, and iron. Result of search for cup markings, oghams, Roman and Anglo-Saxon legends. The sybstel. Religious establishments. Remains of Bishop Vivian at Bodmin. Relics, seals, plate, legendary and armorial stained glass, oak carvings, merchants' marks, grotesque designs, &c. Preservation of ancient monuments, &c.

THE MOORISH EMPIRE IN SPAIN.

SYLLABUS OF PAPER BY R. H. MCCARTHY.

(Read 4th March, 1886.)

THE rise and progress of Mahometanism. Condition of Spain when invaded by Saracens. Conquest of the Peninsula. Sketch of the history of the Moorish Empire in Spain. Gradual decline. Limited to province of Granada. Final subjugation by Ferdinand and Isabella. Persecution of the Moors. Their expulsion from Spain. The Spanish Arab civilization. Their eminence in literature and science. Forward condition of commerce and agriculture. Causes of the decline of their empire. Their expulsion injurious to Spain. Was the Mahometan system of conquest cruel? Past failures of Christians and Mahometans to amalgamate. Efforts in that direction in India.

THE ENCLOSURE OF COMMONS AND OPEN SPACES, WITH SPECIAL REFERENCE TO DARTMOOR.

SYLLABUS OF PAPER BY E. NICOLLS.

(Read 11th March, 1886.)

PREHISTORIC times, when the whole of England was a common. Occupancy, the original title to the exclusive use of land. The noble savage. The gradual enclosure and cultivation of land. Lords of manors and commoners. Title by custom. Enclosure of commons in recent times. How effected. Veto of the lord of the manor. Benefit to districts where commons have been enclosed. Illustrations: Calstock Common, Callington Common. What may be done with the land yet common. Illustration: Viverdon. Should any limit be placed on the enclosure of commons? Land decreasing. Needs arising from increased population. Peasant proprietary. "Three acres and a cow" apart from politics. The good of the State the main consideration. Restitution of land taken from commons. Dartmoor: its extent, capabilities. Model colony on border of Dartmoor. Economic considerations. Conclusion.

NOMENCLATURE OF ROCKS.

SYLLABUS OF PAPER BY F. J. WEBB, F.G.S.

(Read 18th March, 1886.)

1. INTRODUCTION. 2. Minerals—various definitions. 3. Rocks, and the principles upon which the several classifications have been based: (a) External characters; (b) Chemical composition; (c) Mineralogical constitution; (d) Internal structure; (e) Origin. 4. The triple division—*Igneous*, *Aqueous*, and *Metamorphic*—the most natural, and best suited to general purposes. 5. Consideration of each of these classes as shown in illustrative, classified, and analytical tables.

THE BRONZE AGE.

SUMMARY OF LECTURE BY FRANCIS BRENT, F.S.A.

(Read 25th March, 1886.)

THE syllabus was as follows :

Europe peopled in the early ages by tribes immigrating from Asia, probably using stone only. The Stone, Copper, Bronze, and Iron Ages referred to. Palæolithic implements found in Europe, Asia, and America. Neolithic implements found all the Continental world over. Copper implements found in North America; also in Egypt and elsewhere. Bronze implements common in the Old World, also in Mexico and Peru. Iron first known in the East. The civilisation of Chaldæa, Assyria, Egypt, and Eastern Europe reached a high condition during their Bronze Age. That civilisation not dependent upon the discovery of iron. Monoliths and Colossi quarried and sculptured without the use of iron tools. Civilisation of Mexico in the sixteenth century; bronze and stone implements only in use; iron not discovered. Bronze implements in Devon and Cornwall.

In conclusion, the lecturer made special reference to the relics of the Bronze Age that have been met with in the two western counties, remarking :

The recorded finds of bronze implements in Devon and Cornwall are numerous in comparison with those in some other counties; and many bronze implements have been met with from time to time, especially in earlier days, but various causes have led to their destruction or loss, and not many now remain for our inspection.

Before much attention was drawn to them by antiquaries and others, bronze implements would be regarded at first, perhaps, with a little interest or curiosity; but as they possessed a marketable value, they would be disposed of to dealers to be melted down, and thus would be lost to science for ever. And many

gold and silver ornaments of great value and of exceeding interest have suffered the same fate.

It was not until a systematic examination of barrows and other places of sepulture had commenced, that the careful records of finds and the preservation of the implements would have taken place.

The earliest record that I can trace of the discovery of bronze implements in the West is that given by Leland, as referred to by Dr. Borlase. He says, "There was found of late Yeres syns Spere Heddes, Axis for Warre, and Swerdes of Coper, wrapped up in lynid scant perished nere the Mount in S. Hilaries Paroch, in Tynne Works."¹ And Camden makes mention of the same find in the following words: "At the foote of this mountaine, St. Michael's Mount, within the memorie of our Fathers, whiles men were digging up of tin, they found Spear heads, axes, and swordes of brasse, wrapped in linnen, such as were sometimes found in the forrest of Hercinia, in Germanie, and not long since in our Wales. For evident it is by the monuments of ancient Writers, that the Greeks, the Cimbrians, and the Britans used brazen weapons, although the wounds given with brasse bee lesse hurtfull, as in which mettall there is a medicinable vertue to heale, according as Macrobius reporteth out of Aristotle. But happily that age was not so cunning in devising means to mischiefe and murthers as ours is."²

In 1802 fragments of bronze swords, lumps of copper, some celts, and some small bars of gold, about the size of quills, were found at Lanant, in Cornwall.³ The bronze implements, for fear of dispute with the lord of the manor, were at once despatched to St. Ives, and melted down, excepting two celts; one of which measured $4\frac{1}{2}$ inches long, and the other $3\frac{1}{2}$ inches long. Inside the latter was one small bar of bright gold. These celts and gold bar were sent to Sir Joseph Banks by Mr. Malachy Hitchins, into whose hands they came, 5th June, 1802.

In the same year (1802)⁴ there were found at St. Hilary, Corn-

¹ *Antiquities of Cornwall*, Borlase, edition 1754. *Ancient Bronze Implements*, pp. 30, 31. LYSONS' *Mag. Brit.* vol. iii. ccxx. edition 1814.

² *Ancient Bronze Implements*, pp. 30, 31. Camden, edition 1637, p. 181; edition 1806, vol. i. p. 17.

³ *Archæologia*, vol. xv. p. 118.

⁴ *Ibid*, vol. xv. p. 120.

wall, crammed into a small space of about one cubic foot, and immediately under the surface of the earth, some swords in fragments, some celts and spear-heads, and lumps of metal weighing 14 or 15 lbs. each, the whole weighing about 80 lbs., which, with the exception of one spear-head, were melted down immediately. These implements were not "wrapped in linen," like those mentioned by Leland, as having been found many years before in the same parish. The farmer who had these implements describes them as being very hard to melt. The spear-head referred to was sent to Sir Joseph Banks by Mr. Malachy Hitchins, at the same time he forwarded those from Lanant.

In 1812 there were found at Mawgan, in Cornwall, a rapier of bronze in a high state of preservation, and a number of bronze celts.¹

At Kenidjack Cliff, Cornwall, an oval jet, a bronze palstave, and two socketed celts, were met with.²

A bronze dagger was found with a stone celt at Benalleck, near Par, Cornwall. Length, 16 inches.³

A bronze palstave was found, "with many others, *in a coffin* at Godolphin Mine, Caradon, probably between 1740 and 1750."⁴

Two bronze armlets were taken from a barrow on Peninnis Head, in the island of St. Mary's, Scilly, about fifty years ago. These are now in the museum at Truro.⁵

In 1791 a bronze celt was found in a barrow in making the road from St. Austell to Charlestown.⁶

In "Five Barrow" field, near Polperro, a fine celt of compound metal was found, as mentioned by Mr. Jonathan Couch, of Polperro, in 1845.⁷

At Angrowse, near Mullion, on removing a circular pile of stones, a bronze dagger, $6\frac{3}{4}$ inches long, with three rivets, was discovered in a pit near the western side.⁸

¹ *Archæologia*, vol. xvii. p. 337. *Ancient Bronze Implements*, p. 465. *Lysons' Mag. Brit.*

² *Journal of Royal Institution of Cornwall*, No. 21. *Ancient Bronze Implements*, p. 467.

³ *Nænia Cornubiæ*, p. 5.

⁴ *Cornish Antiquities*, Canon ROGERS' MSS., *Nænia Cornubiæ*, p. 41.

⁵ *Nænia Cornubiæ*, p. 162.

⁶ Canon ROGERS' MSS., *Nænia Cornubiæ*, p. 188.

⁷ *Nænia Cornubiæ*, p. 189.

⁸ *Ibid.* p. 235.

In some of the numerous barrows on Broad Down, near Sidmouth, Devon, examined under the superintendence of Mr. P. O. Hutchinson, the Rev. R. Kirwan, and others, there have been found several interesting implements and other relics of the Bronze Age.¹ They are distinguished by numbers in the list given.

In grave No. 53, examined by the Rev. R. Kirwan in July, 1868, was a cup made of Kimmeridge coal.

In grave No. 61, examined by the Rev. R. Kirwan in 1870, were a bronze dagger and a cup of Kimmeridge coal, also a bronze spear-head and rivet.

In grave No. 62, examined by the Rev. R. Kirwan, was a socketed bronze celt.

In grave No. 28 were four broken pieces of bronze.

In grave No. 78 were said to have been found by labourers in Matthew Lee's time, in 1763, about one hundred bronze palstaves—four of these were procured, and are now in the museum at Exeter; one in addition to these was obtained subsequently. These celts appear to have formed the stock of a bronze founder, from their unfinished condition.

At Worth, Washfield, Devon, were found a sword and two leaf-shaped spear-heads.²

A quantity of spear-heads, mostly barbed and all broken, were met with at Bloody Pool, South Brent, Devon.³

In 1868, at Plymstock, Devon, there were found sixteen celts, a straight chisel, three daggers, and a tanged spear-head. The greater number of these were given by the Duke of Bedford to the British Museum, the remainder to the Royal Albert Museum at Exeter.⁴

Six swords, all of the rapier character, with blades varying in detail from 12 to 22 inches long, were found at Talaton, Devon.⁵

A portion of a bronze dagger and the pommel of a dagger-handle of dark amber, set with small pins of gold, were taken

¹ Report of the Barrow Committee, *Trans. Devon. Assoc.* vol. xii. pp. 119-151.

² *Archæological Journal*, vol. xxiv. p. 120. *Ancient Bronze Implements*, p. 464.

³ *Archæological Journal*, vol. xii. p. 84, vol. xviii. p. 160.

⁴ *Archæological Journal*, vol. xxvi. p. 346. *Trans. Devon. Assoc.* vol. iv. p. 304. *Ancient Bronze Implements*, p. 464.

⁵ *Archæological Journal*, vol. xxiv. p. 110. *Ancient Bronze Implements*, p. 250.

from a barrow on Hamildon, Dartmoor, by Mr. C. Spence Bate, in 1872, and are now in the museum of the Plymouth Institution. The amber pommel is very beautiful, and is believed to be unique. It is figured in Dr. Evans's *Ancient Bronze Implements*, also in the *Transactions of the Devonshire Association*, vol. v. Part 1.¹

An interesting bronze palstave, found at Yealm Bridge, Devon, is likewise in the museum of the Plymouth Institution.

About 1878 a barrow was destroyed near Dozmare Pool, Cornwall. I have been informed that amongst pieces of pottery, &c., there was found a bronze spear-head, with *linen* attached to it. I cannot find out in whose possession this spear-head now is.

In 1837 a beautiful gold cup, belonging to the Bronze Age, was



found in a barrow at Rillaton, near the Cheesewring, and is now in the British Museum. With this was also a bronze dagger.² I am indebted for the very interesting sketch, reproduced above, to Mr. G. Jago, who made it on the spot.

During some alterations of the road in 1884, there were found in Torr Lane, near Plymouth, in the bank of a hedge, some bronze implements, consisting of two palstaves (one broken), a celt, some coins, and other articles. These were claimed by the contractor; and in spite of the earnest endeavours of an influential gentleman in the immediate vicinity, could not be obtained for the museum of the Plymouth Institution, and have been taken out of the county.

¹ *Ancient Bronze Implements*, p. 228.

² *Nænia Cornubiæ*, p. 37. *Archæological Journal*, vol. xxiv. p. 189. *Ancient Stone Implements*, p. 408.

Whilst some excavations in connection with the erection of the new forts were being made at Stamford Hill, Turnchapel, Devon, in 1865, a group of graves was met with, the interments in which had been by inhumation. Some exceedingly interesting discoveries were made, and amongst other articles, such as broken urns, fragments of glass and iron, there were found portions of two bronze mirrors, some bronze armlets and fibulæ, with portions of ear-rings, &c. The mirrors are of much interest; they belong to the Bronze Period; they are of late Celtic, not Roman type. One of them is highly ornamented on the back, whilst the face retains much of its original lustre. The ornamentation consists of lines of flowing scroll work, with cross hatchings in the interstices. The pattern is continued on the solid bronze handle, which is stated to have been found in another grave. This mirror is not circular, but has a somewhat elliptical form, in this respect resembling the bronze mirrors that have been found at Thebes.

The Fort Stamford mirror is of the same style as one found at Birdlip, on the Cottiswold Hills, near Gloucester, in 1879, which was enclosed in one of three cists, similar in construction to those at Turnchapel.¹

Another mirror was found at Trelan Barrow, in the parish of St. Keverne, Cornwall, in 1833, in a grave formed of six slabs of stone set on edge—two forming each side, and one at each end. The ornamentation consisted of triangular spaces, alternately plain. Across the centre line are two circles enclosing smaller circles, and curvilinear lines in a style similar to that of the ornament of a collar-like object found at Balmaclellan, with another bronze mirror. The ornamentation resembles that on the Stamford Hill mirror.²

Dr. Joseph Anderson says, "These mirrors all differ in their form and in the composition of their metal from Roman mirrors, and they differ in certain characteristics of their ornament still more widely from the Roman style. They are distinctively Celtic."³

Director Mr. A. W. Franks, of the British Museum, after inspection of the Fort Stamford remains, remarks, in a note following Mr. C. Spence Bate's description of the discovery, "I should be disposed to attribute the mirror from Plymouth to a

¹ *Pagan Scotland*, p. 132.

² *Ibid.* pp. 128, 132.

³ *Ibid.* p. 133.

late Celtic origin. The only other mirrors with ornamented backs are the Etruscan; in their elliptical form the specimens under consideration are not altogether unlike Egyptian mirrors. To a late Celtic origin I should also be inclined to refer the armlet engraved on Plate 31, Fig. 1. Some of the pottery is purely Roman."¹

A small grave of similar construction to those on Stamford Hill was brought under my own notice in 1880, whilst some excavations were being made in Stillman Street, Plymouth. This grave contained a large urn of finer ware than those found in early British graves, and when discovered was in a perfect condition, and was stated to have been half filled with earth. This might have been burnt bones; but as the urn was smashed by the labourers, all traces of this earth were lost, and I was able only to procure a few shards of the urn, which are deposited in our museum. This grave probably belonged to a period closely allied to that of the Stamford Hill cemetery, which is of especial interest, as it seems to form the connecting link between the Stone Age people of Staddon and Maker with the Iron Age people of early Plymouth, itself belonging to the late Bronze Age.

¹ *Archæologia*, vol. xl. p. 510.

RISSEO'S GRAMPUS.

(*Grampus Griseus.*)

BY F. H. BALKWILL.

THE latter part of last year, and the commencement of the present, have been marked in the neighbourhood of Plymouth by the occurrence of Cetaceans, of which I have obtained the following particulars :

About the end of October, 1885, the bodies of two whales were found floating in the Channel, and were towed into Plymouth Sound, and exhibited for some time under the Hoe. They were a pair. The female was found near Dartmouth, the male south of the Eddystone. As the male was found to have had its back-bone dislocated by violence, it seems probable that they may have come into collision with some vessel whilst consorting together. They were black above and white below, with the longitudinal plaits in the skin under the jaws and belly, distinctive of Rorquals. The following dimensions were taken with twine following the curves :

DIMENSIONS OF RORQUALS.

	Male.			Female.		
	ft.	in.		ft.	in.	
Length from tip of snout to centre of tail .	60	2	...	63	0	
Length of mouth	13	8	...	13	8	
Length of flipper	6	9	...	6	8	
From muzzle to insertion of flipper	21	11	...	22	2	
Width of caudal fin	14	9	...	15	0	


The female had collapsed, and was in such a flaccid condition that some difficulty was found in taking her length ; and as that of her mouth was the same, and that of her flipper slightly less than in the male, doubt was felt as to the accuracy of measurement. But the length to insertion of flipper and the width of caudal fin being both greater than in the male, fairly establish her larger size. The balæna of the male was of a grey-slate colour, tinted with pink, which, with the comparatively short length of the flippers, determines the species to be the Common Rorqual (*Balænoptera musculus*).

A much rarer visitant occurred on February 3rd of this year, when a fisherman named Simpson caught a Risso's Grampus in a mackerel net, about twenty miles south of the Eddystone. This was exhibited about the streets of Plymouth for some days, when I finally secured it. As our experience in preserving large porpoises has not been encouraging, the skin was presented to the Exeter Museum through Mr. Brent; and I am informed by Mr. James Dallas, the Curator, that he hopes to be more successful. The skeleton I am preparing for our Museum. Our valued member Mr. Spence Bate, F.R.S., has assisted me in taking the following dimensions:

 RISSO'S GRAMPUS (*Grampus Griseus*).

	ft.	in.
Length from point of nose to centre of tail	9	0
Length to anterior insertion of flipper	1	8
Width of flipper	0	6½
Length of flipper	1	8½
Greatest width of flipper	0	9
From posterior insertion of flipper to notch in caudal fin	7	2½
Length of gape	0	11
From tip of nose to eye	1	2½
Depth of frontal region	0	11½
Distance from eye to blowhole over curve	0	11½
Length from nose to blowhole over curve	1	6½
Length from blowhole to base of dorsal fin	2	7
Length of dorsal fin at base	1	0½
Height of dorsal fin from centre to apex	1	2
From posterior base of dorsal fin to centre of tail	3	11½
Width of caudal fin	2	1
Greatest girth at anterior insertion of dorsal fin	5	2
Girth round head by the eye	3	8½

Estimated weight about 6 cwt.

The general colour was black, the muzzle and belly being of a greyish white, shading off into the more general tint, marked with scoriated lines and patches, of which the accompanying engraving will give some idea. The blowhole, which was single, and almost exactly over the eye, was of the shape of a capital  looking forward. The flippers were scimitar-shaped; the dorsal fin high and falciform. There were three small teeth on each side the lower jaw towards the front; none in the upper jaw. The skin was very thick, at one place measuring a quarter of an inch; but this was from one of the thinnest parts, and a good deal of it must have been half an inch or more. The stomach was empty; but as a previous example, taken near the Eddystone in February,

1870, was also caught in a mackerel net, we may infer it was in pursuit of these fish. It groaned when caught and when dying.

In Bell's *British Quadrupeds* three British specimens are recorded, which, with one since, will make this the fifth example.

Mr. Henry Newman, of Leominster, has kindly furnished me with Risso's original description, of which the following is a translation :

"*Delphinus Risso*. Blower or Spouter. Back broad ; head large ; blunt. Upper jaw the longest.

"The disposition of this Cetacean appears to be gentle, like the temperate zone which it inhabits. It only frequents our shores (Nice) at the pairing season. Its body is elongated, roundish, swelling up towards the front, insensibly diminishing in size towards the tail, which is compressed.¹

"The skin is thin, of a grey colour, clouded, bluish, and traversed by irregular marks and whitish lines, straight and crooked. The belly is of a dull white ; the head very large, with a blunt, round muzzle, rising in a curve, pierced towards the neck by the blowhole ; the mouth is large, curved. The upper jaw, provided with sockets only, is more prominent, and covers the lower, which is armed on each side by five large teeth, conical, pointed, and a little curved, separate, and strongly embedded in the bone of the jaw—these teeth are solid, nearly equal, of a yellowish white, and covered by a very shining enamel. The interior of the throat is covered with blunt tubercles. The tongue is free, with smooth sides. The eyes are oval, oblong, very small, with golden irides.

"The dorsal fin, high and pointing upwards, nearly in the shape of scalene triangle. It is placed nearly in the middle of the back. The flippers are large, sword-shaped, and blackish. The tail is strong, divided into two large lobes by a definite notch.

"Length, three metres.

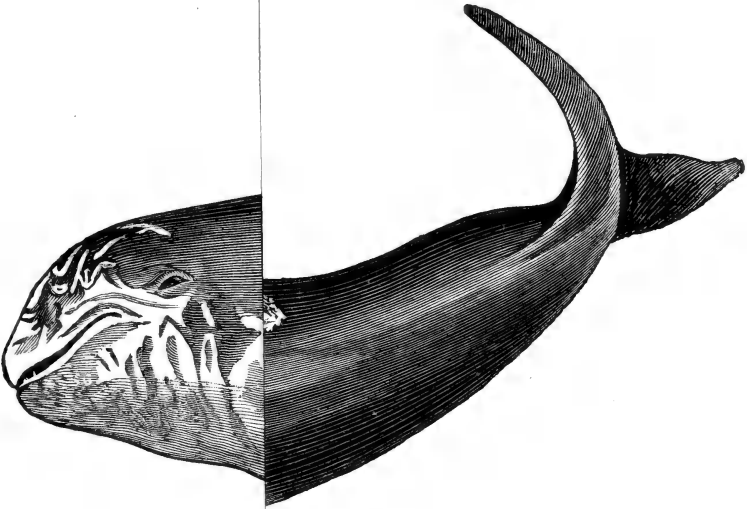
"*Large*² (*sic*), one metre.

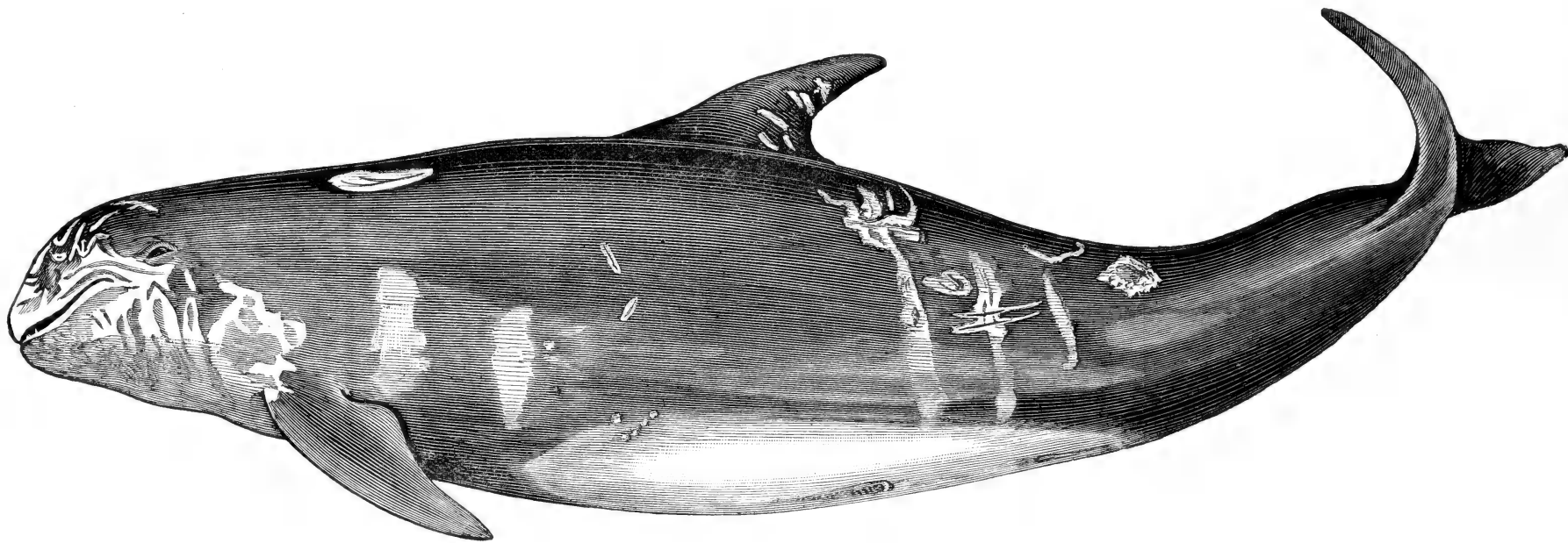
"Found on the surface of the water in spring and autumn."³

¹ M. Risso by tail probably means the part just anterior to the caudal fin. This is markedly compressed, being nearly three times as deep as thick.

² I can only understand by Risso's "large" that he meant the depth from top of dorsal fin. The circumference of our example—which, allowing it to be a little deeper than broad, would give a depth for the body of twenty-one inches, to which add fourteen, height of dorsal fin—would give thirty-five inches as the depth of the individual ; this would be about right.

³ Risso's *Natural History of South Europe*, vol. iii. p. 23.





RISSO'S GRAMPUS.

This species was considered distinct from *Grampus griseus* by Cuvier; but they were united by Professor Flower in a paper read before the Zoological Society in 1871, on two specimens taken in the Channel, one in a mackerel net near the Eddystone, in February, 1870, a female, which had lately given birth to a young one; and a young one, supposed to be the offspring, taken later near the Isle of Wight.

With reference to this connection, it is rather singular that in 1869-70—I cannot fix the date nearer—the Plymouth daily papers reported a “*small whale*” as having been stranded on the Whitsands. This I went to see; but it had been already used for manure by a farmer. My informant, a farm labourer, described it as about twelve feet long, with a blunt, big head, not like a porpoise; and left an impression on my memory which very well agrees with this Grampus. If this conjecture be correct, we may have the whole family accounted for. The accompanying engraving is from a drawing of our specimen by Mr. T. C. Richards, which appeared in the *Field* newspaper March 13th, 1886, and has been kindly lent by the proprietors for use in our *Transactions*.

CONTRIBUTION TOWARDS THE FAUNA OF THE
NEIGHBOURHOOD OF PLYMOUTH.

BY G. C. BIGNELL, F.E.S.

HYMENOPTERA ; ICHNEUMONIDÆ.

Arranged according to the Rev. T. A. Marshall's Catalogue, published by the Entomological Society of London, 1872; the Braconidæ by the Monograph published in 1885.

PART IV.

- ICHNEUMON *impressor*. Bred from *Gortyna ochracea*, 24th June.
primatorius. Bred from *Triphaena fimbria*, 22nd June.
curvinervis. Plymbridge, 26th May.
leucomelas. Bred from *Noctua brunnea*, 22nd June.
bipunctorius. Exeter, 24th August.
- AMBLYTELES *armatorius*. Bred from *Triphaena orbona*, 21st July.
crispatorius. Bickleigh, 1st August.
notatorius. Bred from *Triphaena fimbria*, 30th June.
- PLATYLABUS *tricingulatus*. Bred, 10th June, from *Eupithecia pulchellata*.
- DICCELOTUS *rufilimbatus*. Egloskerry, 23rd July.
pusillator. Bickleigh, 19th September.
- CENTETERUS *opprimator*. Bickleigh, 21st August.
- PHÆOGENES *calopus*. Bickleigh, 4th August.
tetricus. A new British species. Exeter, 17th August.
- STILPNUS *pavoniæ*. Cann Quarry, 26th September.
- PHYGADEUON *caliginosus*. Stonehouse, 21st August.
jejunator. Bickleigh, 5th August.
improbis. Bickleigh, 1st August.
arridens. Bickleigh, 5th August.
lacteator. Bickleigh, 19th June.
sperator. Horrabridge, 3rd June.
galactinus. Bickleigh, 24th June.
- CRYPTUS *titillator*. Bickleigh, 1st August.

- CRYPTUS arrogans*. Bickleigh, 1st August.
hostilis. Plymbridge, 24th September.
alternator. Bickleigh, 5th August.
pygoleucus (= *Agrothereutes hopei*). Bickleigh, 14th Sept.
- HEMITELES imbecillus*. Dousland, 23rd August.
ridibundus. Shaugh Bridge, 22nd May.
melanarius. Bred from *Argynnis paphia*, 8th July.
inimicus. Bred from — (?), 14th April.
tenerrimus. Dousland, 23rd August.
gracilis (Thoms.). A new British species. Bickleigh, 9th September.
furcatus (Tasch.). A new British species. Bickleigh, 5th August.
cuprolus (Thoms.). A new British species. Oreston, 20th September.
- APTESIS hemiptera*. Bred, 2nd July, from *Euzophera cinerosella*, feeding in the stems of Wormwood, in June, at Slapton.
- HEMIMACHUS annulicornis*. Plymbridge, Bickleigh, Exeter.
- PEZOMACHUS tener*. Exminster, 1st July.
castatus (Bridgman). New species. Plymbridge, 7th August.
juvenilis. Bickleigh, 14th September.
micrurus. Bred 16th July, the larva feeding on newly-hatched spiders. The parent spider (*Lycosa amentata*) always carries its egg-bag until the young brood is able to care for themselves. The spider with its egg-bag was taken at Horrabridge on the 23rd June.
- ANOMALON arquatum*. Bred from *Tæniocampa gothica*.
- AGRYPON flaveolatum*. Bred from *Tæniocampa miniosa*, 24th March.
tenuicorne. Bred from *Anisopteryx æscularia*, 25th May.
- CYMODUSA leucocera*. Oreston Quarry, 20th September.
- SAGARITES zonata*. Bred from *Hecatera serena*, 11th September.
- LIMNERIA alticola*. Crabtree, 28th August.
argentata. Pennycomequick, 31st July.
armillata. Laira, 13th July.
auctor. Bickleigh, 4th September.
brevicornis. Bickleigh, 4th September.
dispar. Bred from *Xylopoda fabriciana*, 3rd September.
ensator. Bred from *Butalis grandipennis*, 15th May.
exareolata. Bred from *Vanessa cardui*, 15th July.
exigua. Hooe, 13th August.
femoralis. Bred from *Depressaria nervosella*, 10th August.

LIMNERIA geniculata. Bickleigh, 24th June.

gracilis. Bred from *Coriscium cuculipennella*, 14th August.

hydropota. Bickleigh, under the viaduct, August and September; common.

erythropyga. Pennycomequick, 31st July; Exeter, 17th August.

pedella (Holmr.). Longbridge, 25th August.

volubilis. Bickleigh, 4th September.

lateralis. Cann Wood, 21st May; Bickleigh, 19th June.

longipes. Plymbridge, 21st September.

notata. Bred from *Gnophos obscurata*, 9th June.

pagaua (Holmr.). Bickleigh, 24th June.

curvicauda. Bred from saw-fly larva (*Nematus gallicola*), 11th October.

assimilis. Plymbridge, 7th August.

rufipes. Bred from *Eupithecia castigata*, 21st April.

sericea. Bickleigh, 4th August.

sordida. Cattedown Quarry, 2nd August.

tristis. Bred from *Pseudoterpna cytisaria*, 22nd June.

tumidula. Bickleigh, 5th August.

viennensis. Bred 21st June from Thrift, in which was feeding *Sericoris littorana*.

CREMASTUS spectator. Bolt Head, 17th June.

infirmus. Bolt Head, 28th June.

ATRACTODES gravidus. Bickleigh, 21st August.

albovinctus. Bickleigh, 8th September.

exilis. Bickleigh, 9th September.

gilvipes (Holmr.). New British species. Bickleigh, 16th September.

properator. Bickleigh, 20th August.

EXOLYTUS lævigatus. Bickleigh, 20th August; Plymbridge, 24th September.

*MESOCHORUS facialis*¹ (Bridg.). New species. Bred from *Apanteles popularis* out of *Euchelia jacobææ*.

dorsalis (Holmr.). New British species. Bickleigh, 21st August.

politus. Bickleigh, 5th August.

vittator. Bred from *Hyponomenta evonymellus*, 14th July.

PLECTISCUS zonatus. Bickleigh, 4th September.

PORIZON harpurus. Bolt Head, 28th June.

minator. Bickleigh, 9th September; Exeter, 2nd September.

¹ This genus are hyper-parasites.

THERSILOCHUS marginatus (Bridg.). New species. Bickleigh, 16th September.

jocator. Plymbridge, 21st September.

BANCHUS moniliatus. Bred from *Anarta myrtilli*, 4th June.

MESOLEPTUS melanocephalus. Dousland, 23rd August.

leptocerus (Gr.). New British species. Plymbridge, 21st September.

CATOGLYPTUS fortipes. Horrabridge, 30th June.

EURYPROCTUS sinister (Brischke). New British species. Longbridge, 25th August.

PERILISSUS filicornis. Bolt Head, 28th June.

subcinctus. Bickleigh, 4th September.

MEGASTYLUS mediator. Exeter, 2nd September.

IDIOXENUS borealis (Holmr.). New British species. Plymbridge, 7th August; Bickleigh, 16th September; Oreston, 20th September.

MESOLEIUS aulicus. Pennycomequick, 31st July.

caligatus. Horrabridge, 16th June.

sanguinicollis. Bred from galls on *Salix caprea*, 10th September.

rufoleptus. New British species. Bickleigh, 3rd August.

lateralis. Bickleigh, 9th September.

TRYPHON brachyacanthus. Bickleigh, 4th August.

POLYBLASTUS varitarsus. Bickleigh, 4th September.

westringi (Holmr.). New British species. Plymbridge, 14th July.

ACROTOMUS lucidulus. Bolt Head, 28th June.

CTENISCUS triangularis. Horrabridge, 30th June.

ustulatus. Bickleigh, 4th September.

extirpatorius. Pennycomequick, 31st July.

EXYSTON cinctulum. Bolt Head, 28th June.

EXOCHUS mansuetor. Bred from *Pyralis farinalis*, 9th July.

curvator. Bickleigh, 19th June.

podagricus. Bred from *Symæthis oxyacanthella*, 18th September.

gravis. Bickleigh, 18th May.

procerus (Holmr.). New British species. Exeter, 17th August.

CHORINAÆUS cristator. Horrabridge, 3rd June.

ORTHOCENTRUS anomalus. Crabtree, 28th August.

affinis. Bickleigh, 19th September.

agilis (Holmr.). New British species. Ivybridge, 20th August.

ORTHOCENTRUS marginatus (Holmr.). New British species. Bolt Head, 6th July.

cognatus (Holmr.). New British species. Plymbridge, 7th August.

BASSUS cingulatus. New British species. Plymbridge, 7th August.

albosignatus. Horrabridge, 3rd June.

insignis. Plymbridge, 20th May.

abdominator (Bridgman). New species. Dousland, 23rd August.

strigator. Laira, 23rd September.

signatus. Longbridge, 25th August.

gracilentus. Bickleigh, 14th September.

elegans. Plymbridge, 7th August.

Sundevalli. Laira, 10th September.

POLYSPINCTA varipes. Bickleigh, 14th September; Exeter, 23rd September.

ACRODACTYLA madida. Bickleigh, 5th August.

degener. Dousland, 23rd August. The larva is an external parasite on full-grown spiders.

GLYPTA monoceros. Bred from *Tortrix costana*, 29th June.

fronticornis. Bickleigh, 9th September.

LAMPRONOTA nigra. Dousland, 23rd August.

caligata. Bickleigh, 4th August.

LISSONOTA terebrator (Bridgman). New species. Bred from *Anticlea badiata*.

vicina. New British species. Bickleigh, 16th September.

decimator. Bred from *Gortyna flavago*, 4th May.

insignita. Plymbridge, 24th September.

BRACONIDÆ.

BRACON nigratus (Wesm.).

erraticus. Bickleigh, 21st August.

lævigatus. Bred from Sawfly galls on *Salix caprea* (*Nematus viminalis*), 22nd August.

tornator. Bickleigh, 9th July.

Satunas. Plymbridge, 30th June.

epitriptus. Bred from a gall of *Hormomyia capreæ*, 3rd September.

larvicida. Bickleigh, 21st September.

prætermisus. Bickleigh, 9th September; Exeter, 10th September.

- BRACON discoideus*. Bickleigh, 9th July; Plymbridge, 14th July.
regularis. Yelverton, 4th August.
variator. Yelverton, 4th August.
osculator. Yelverton, 4th August; Bickleigh, 4th September.
obscurator. Bred from *Homæosoma sinuella*, 28th May.
anthracinus. Bovisand, 25th June; Bickleigh, 9th July.

PHANOMERIS fragilis.

- COLASTES decorator*. Plymbridge, 30th June; Bickleigh, 9th July.
hariolator. Bickleigh, 14th September.
braconius. Bred from old oak leaves, 28th April; Bickleigh, 9th July; Ivybridge, 20th August.

ONCOPHANES lanceolator. Bred from *Tortrix viridana*, 14th June.

RHOAS dimidiatus. Bred from *Agrotis tritici*, 4th July.

- gasterator*. Yelverton, 4th August.
geniculator. Bred from young larva of *Odonestis potatoria*.
tristis. Bred from *Satyrus* (= *Epinephele*) *tithonus*, 17th July.
circumscriptus. Very common, and on many larvæ. *Ebulea crocealis*, 20th June; *Tæniocampa stabilis*, 20th June; *Melanippe galiata*, 21st September; *Agrotis agathina*, 9th April; *Noctua neglecta*, 1st April.

SIGALPHUS caudatus. Whitsand Bay, 13th September; Exeter, 14th September.

- obscurellus*. Bred from *Gymnetron noctis* larva (a beetle), feeding on the unripe seed of the toad flax, 9th September.

CHELONUS inanitus. Common; Plymbridge, Bickleigh, Oreston Quarry, &c.

- carbonator*. Oreston Quarry, 1st August.
parcicornis. Bickleigh, 9th July.

ASCOGASTER canifrons. Bickleigh, 9th July.

- annularis*. Bred from old furze-sticks containing larvæ of *Æcophora lambdella*.

- rufipes*. Bred from a *Tortrix* off birch, 17th July.
rufidens. Bred from *Gracilaria syringella*, 26th July.
quadridentatus. Bred from *Eupithecia absinthiata*, 8th July.

APANTELES solitarius. Bred from *Orgyia antiqua*, *Tæniocampa miniosa*, 4th July; and *Hybernica defoliaria*.

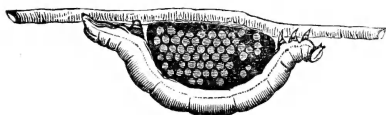
- ruficrus*. Bred from *Leucania littoralis*, 27th May; *Spilosoma menthastri*, 7th September.

- congestus*. Bred from *Hadena pisi*, 12th October.

- Bignellii*. Bred from *Melitæa aurinia*, 26th July.

- APANTELES limbatus*. Bred from *Abraxas grossulariata*, 14th July.
rubripes. Bred from *Geometra papilionaria*, 17th July.
rubecula. Bred from half-grown larvæ of *Pieris rapæ*, 17th June; one only in a larva.
glomeratus. Bred from *Pieris brassicæ*. I have found 142 cocoons from one larva; the usual numbers vary from forty to eighty. It also infests *P. rapæ* and *Abraxas grossulariata*.
sericeus. A solitary parasite. Bred from *Tethea retusa*, 28th June; *Dianthæcia cucubali*, 15th May; *Eupithecia pulchellata*, 13th July.
spurius. A gregarious parasite. Bred from *Vanessa urticæ*, 1st September; *Melitæa aurinia*, 15th May; *Leucania littoralis*, 31st May; and *Agrotis præcox*, 26th June.
zygænarum. Bred from *Zygæna filipendulæ*, 21st July.
caia. Bred from *Arctia caia*, 21st April and 30th June.
juniperatæ. Bred from *Odontoptera bidentata*, 2nd April; *Selenia bilunaria*, 12th July; *Crocallis elinguaris*, 3rd April; *Himera pennaria*, 19th June.
nothus. Bred from *Anticlea badiata*, 26th June; *Epinephele Ianira*, 1st August; *Melanippe galiata*, *Tethea retusa*, *Spilosoma menthastri*, 1st August.
difficilis. Bred from *Zygæna filipendulæ*, 26th July; *Euchelia jacobææ*, *Bombyx rubi*, 17th August; *Agrotis præcox*, *Hadena pisi*.
punctiger. Bickleigh, 24th June.
falcatus. Bred from *Xylophasia monoglyphæ*, 24th July.
dilectus. Bred from *Gracilaria syringella*, 16th July.
xanthostigmus. A solitary parasite. Bred from *Diurnea fagella*, 11th September.
prætor. Oreston Quarry, 1st August.
emarginatus. Bred from *Depressaria nervosa*, 2nd August.
obscurus. A solitary parasite. Bred from *Ebulea crocealis*, 12th and 30th July.
viminetorum. Bred from *Elachista magnificella*, 30th June.
albipennis. A solitary parasite. Bred from *Lioptilus microdactylus*, 22nd June; found in March in the dead stems of *Eupatorium cannabinum*.
impurus. Bred from *Tortrix Forsterana*, 2nd August.
gagates. Bickleigh, 21st and 29th August.

- APANTELES fuliginosus*. Bred from *Gracilaria syringella*, 16th July.
sicarius. Bred from *Sericoris littorana*, 19th June.
octonarius. Bred from *Notodonta ziczac*, 23rd July.
abjectus. Bred from *Lophopteryx camelina*, 27th May.
immunis. Bred from *Pseudoterpna pruinata*, 20th July ;
Hybernia marginaria, 12th June ; and *H. leucophæaria*,
 23rd June.
caberae. A solitary parasite. Bred from *Cabera pusaria*, 5th
 April ; *Iodis lactearia*, 4th May ; *Selenia bilunaria*, 14th
 April.
popularis. Bred from *Euchelia jacobææ*, 20th July.
fraternus. Bred from *Aspilates ochrearia*, 20th September.
pallidipes. Bred from *Plusia gamma*, 16th October.
bicolor. Bred from *Gnophos obscuraria*, 5th June.
formosus. Bred from *Uropteryx sambucaria*, 4th May.
callidus. Bred from *Nemeophila plantaginis*, 8th June ;
Abraxas grossulariata, 7th June ; and *Triphæna orbona*.
lateralis. Bred from *Symæthis oxyacanthella*, 15th September.
vitripennis. Bred from *Boarmia repandata* larva not half-
 grown, 14th April.
fulvipes. Very common on numerous larvæ found in the spring.
- MICROPLITIS ocellatæ*. Bred from *Smerinthus populi*, 8th May.
vidua. Bred from *Tæniocampa incerta*, 30th July.
tristis. Bred from *Dianthæcia cucubali*, 22nd May.
mediator. Bred from *Cerastis spadicea*, 30th June.
mediana. Bred from *Tæniocampa stabilis*, 4th September.
tuberculifera. Bred from half-grown larvæ of *Tæniocampa*
miniosa, 19th June.
- MICROGASTER alvearius*. Bred from *Boarmia gemmaria*. I bred
 the extraordinary number of 133, on the 21st August
 last, from one caterpillar, found on jessamine at Laira.
posticus. Bred from *Porthesia similis*, 25th July.
flavipes. Bred from *Boarmia repandata*, 26th June.
minutus. Bred from *Cleora glabraria*.
marginatus. Bred from *Larentia viridaria*, 28th May.
calceatus. Bred from *Thera variata*, 24th June.
connexus. Bred from *Porthesia similis*, 18th August.
subcompletus. Bred from *Vanessa Atalanta*, 11th August ;
Hypena proboscidalis, 7th June.
tibialis. Bred from *Emmelesia decolorata*, 4th September.
spretus. Bred from *Rhodophæa consociella*, 14th July.



The above figure represents the larva of *Boarmia repandata* covering the cocoons formed by the larvæ of *Microgaster flavipes*, from which seventy flies were bred.

The larvæ of these *Microgaster*s when full-fed (then within the body of their victim) emerge simultaneously from both sides of the body of the caterpillar, each making an aperture for its exit. They then at once unite in making a web over and around the twig, the foundation from which the honeycomb-like mass is suspended. This spinning and weaving is, to all external appearance, completed in about seven hours, but to finish the internal lining of each cell would take some time longer.

Before and during the escape of the parasitic larvæ the victim remains on the upper side of the twig; in about twelve hours it will be found to have glided to the under side, and to cover the *Microgaster* cocoons containing the larvæ that had emerged from it, in such a way as to suggest the idea of affording them protection, as shown in the illustration. Why this marvellous proceeding I cannot conjecture, seeing that the unfortunate caterpillar must be half-dead, having had its sides pierced with seventy holes by the escape of these parasitic larvæ, and quite dead long before the flies emerge.

In September last I saw the similar batch of cocoons at Laira, on jessamine, referred to above, which produced the extraordinary number of one hundred and thirty-three flies of *Microgaster alvearius*, these were from a larva of *Boarmia gemmaria* (= *rhom-boidaria*).

Similar cocoons are made by *Apanteles fraternus* out of *Aspilates ochrearia* (= *citraria*); and *Microgaster minutus* from *Cleora glabraria*.

The mass of cocoons in the engraving is shown after the escape of the fly. The majority appear to have escaped on one side, a few on the other. It was engraved from a photograph by the writer.

STONEHOUSE, 30th March, 1886.



3 0112 062047920